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DEVOTED TO THE IMPROVEMENT OF CITIES

CONCRETE CONSTRUCTION, PAVING, SEWERAGE, WATERWORKS, STREET LIGHTING, PARKS, GARBAGE DISPOSAL, BRIDGES.

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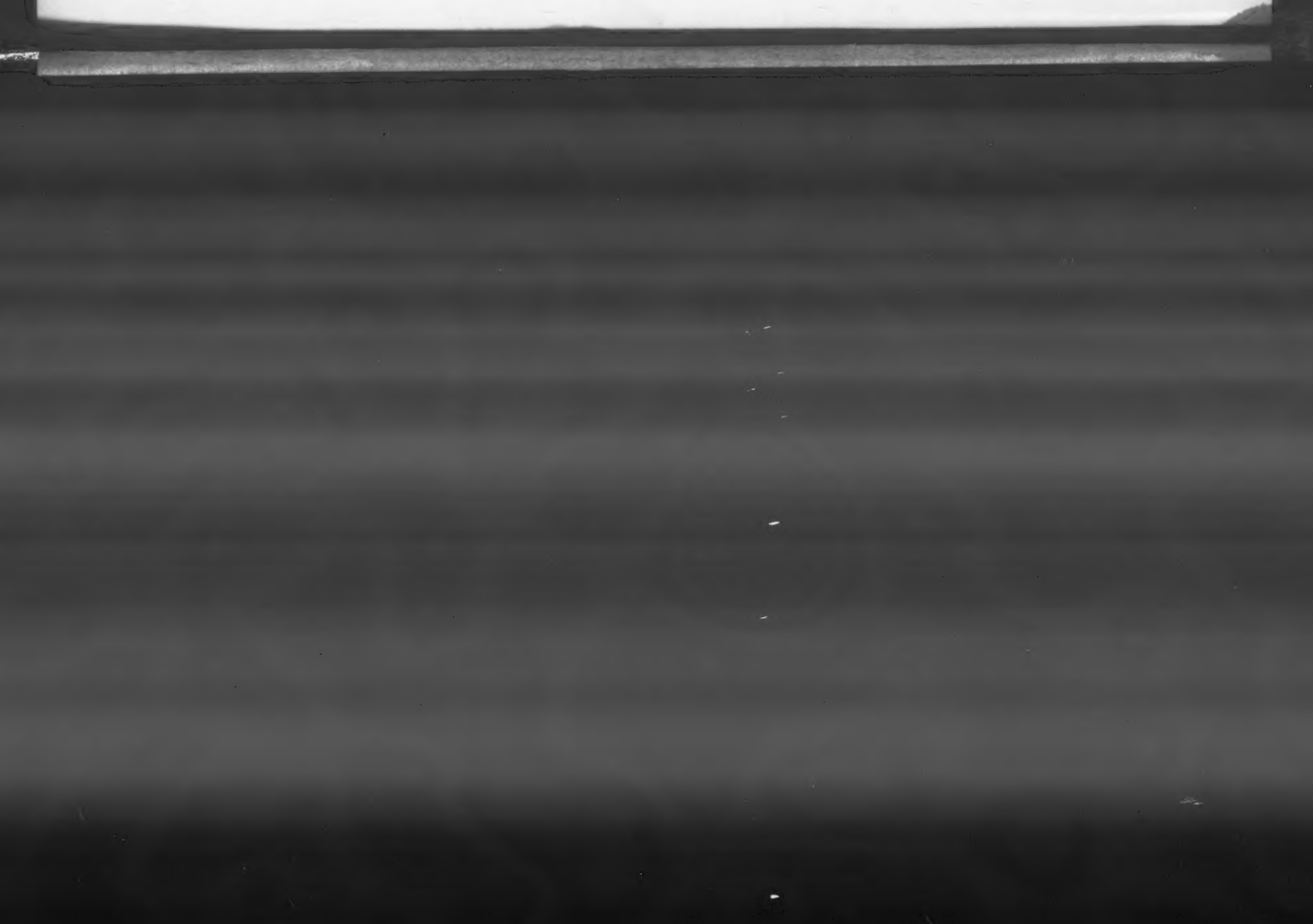

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MUNICIPAL ENGINEERING

VOLUME XXXV. NOVEMBER, NINETEEN HUNDRED EIGHT. NUMBER FIVE

THE PROPER CONSTRUCTION OF BRICK STREET PAVEMENTS.*

By Will P. Blair, Secretary of National Association of Paving Brick Manufacturers, Indianapolis, Ind.

THE use of vitrified brick or block for streets and roadways is an American idea, which originated about thirty years ago. It was developed from the use of brick made from the ordinary surface clays for such purposes in a few of the smaller cities of Indiana and Illinois. Shortly afterwards brick made from fire clay in the upper Ohio valley were used for a like purpose.

It will probably never be established as to who made the first vitrified brick from shale in this country. One thing is certain, that the first stiff mud brick made from a mixture of shale and common clay were produced in central Illinois. These were used for street paving purposes and naturally followed the use of the common brick for street paving, and thus, more by accident than design, such brick were found to resist the wear of travel with greater success than the brick made from the surface clays, and thus the value of vitrified brick for paving purposes was established.

In like manner, it may be truthfully said that for many years following the earlier manufacture and use of paving brick, progress toward betterment was, to a very great extent, merely incidental. The extended use for street paving purposes was slow. Few of the earlier manufacturers, if any, realized the development about to take place, and very few of the manufacturers had any concern of the relation their uses bore to the importance of the business.

The demands for the product, however, grew continuously, regardless of the fact that so few were giving any attention whatever to their proper use as a street paving material. Finally, some few of the manufacturers began to realize that the lack of appreciation of brick streets was due to the fact that they were almost universally built without consideration, either as to the physical advantage, insuring durability, or in a manner making possible the greatest satisfaction to the user. The few, however, whose eyes were opened to the facts, began a careful study and inquiry into the methods of construction promising to afford the greatest satisfaction possible from every standpoint.

A few engineers in the central west early realized the importance of proper construction, and appreciated more than the manufacturers what the future had in store for vitrified brick. These engineers and these manufacturers, while maintaining the value of the use of a good quality of vitrified brick for street construction, were convinced of the utter folly of depending upon that alone, and saw that other elements were equally necessary. It is not too much to say that even now the brick are too often required to bear the burden for a satisfactory street. Neither is it putting it too strong to say that the criticisms offered against brick streets are due, in nine cases out of ten, to other causes than the quality of the brick.

In the month of July of this year, we had the opportunity of examining the brick streets in more than fifty cities east of the Allegheny Mountains. We were greatly surprised that in but three cities did we find the essential details of brick street construction at all complied with. Many of the details of a properly constructed brick street seem not to have found lodgment with

*A paper before the American Society of Municipal Improvements.

those who are charged with their construction, as being in the least degree important; they are, nevertheless, absolutely necessary for the construction of high class brick pavements.

It is, therefore, the purpose of this paper to point out the essentials which are often overlooked, ignored, or in some way, or on some account neglected, rather than to follow out all of the directions necessary from foundation to finish.

I wish, however, to emphasize one thing—that, while a compliance with the details of construction that may be here suggested is vital in their importance to the value of the street, nevertheless, not a single suggestion here made is difficult in the least degree, neither adds greatly to the cost. If neither difficult nor costly, why are they not complied with? Practically all of these requirements are suggested in the "Directions for Laying Brick Street Pavements," which are promulgated by the National Paving Brick Manufacturers' Association. These directions or specifications have been adopted by practically all of the progressive engineers of this country. We wish, therefore, to give a brief answer to this question later on in this paper.

The preparation of the sub-grade for brick streets does not differ essentially from that necessary in case of streets constructed with other materials. It must be drained, graded, compacted, and established in conformity with the grade of the finished street. This must be accepted as necessary by everyone. A depression here and there in the grade, a spot of loose earth, a lack of thorough compaction, or a wet condition improperly drained must, without question, be followed by conditions of the street that will bring disaster to the street as a whole.

As to the quantities of the mixture that enters into the concrete foundation, so much depends on the quality of the cement to be used, the quality of the sand, gravel, stone, etc., that we will not undertake to say what proportion of cement, sand, broken stone, or gravel shall be used. Suffice it to say that the quantities must be such as will make absolutely sure the quality. There are, however, some fixed and well-known conditions in the preparation of the mixture of the concrete foundation that, in order to insure the quality of the concrete, must be observed, whether or not the concrete be machine or hand mixed. In order that it shall be its maximum strength, it must be mixed dry in the first instance and then thoroughly mixed after the water is applied.

Either in the machine or hand mixing an intelligent supervision is worth while at all times. I have observed very often the value of the concrete reduced at least 50 per cent. by carelessness, by ignorance or indifference, by the application of too much water, or by the application of too little water, by the lack of a proper proportion of some one or another of the other ingredients composing the foundation, resulting in a square yard, two square yards, or three square yards of the concrete foundation being of no more value to the street itself than a loose pile of broken stone or gravel. The manner of making the concrete foundation thus absolutely insures its failure; such concrete being so mixed that if it were in a building, the building would fall of its own weight, as has happened in many instances. Such conditions obtaining in a street, while not insuring a fall, do insure a failure.

This concrete as it is put in place must have a uniform surface with the grade of the finished street. Just at this point are found conditions of very great frequency which insure the failure of the street. We have said it must have a grade uniform with the grade of the finished street. The surface of it must be smooth. This can not be accomplished by depending upon the eye; the grade stakes should be set at no greater distance apart than four to five feet. If any stone used in the concrete exceeds in size two inches in its largest dimension, it will be next to impossible to accomplish the condition desired. Sufficient water should be used in the mixture so that one man can smooth the top with an ordinary dirt shovel—never should it be so stiff as to call into use a rammer. It has been an interesting study from the view-point of both the engineers' and contractors' experience in this matter as to what a uniform and smooth surface means when applied to a concrete foundation. With some, a range of grade from two to three inches furnishes a fine job. We wish to emphasize that a greater variation than one inch is utterly inexcusable in the matter of a concrete foundation for brick streets.

The sand cushion must be two inches in thickness; if less than two inches, it will not afford a sufficient relief from the vibration created by the impact of travel. If more than two inches, it can not be sufficiently com-

pacted to afford a support to the load coming upon the brick street, and prevent cracking and crushing of the joints of the cement filler, which is required in finishing the street. Thus, this cushion must be of such a thickness that will afford a relief from the impact and weight, slight though it be, yet sufficiently unyielding to furnish the support for the load it must bear. But why do we lay down the hard and fast rule of two inches as meeting these physical conditions? The best answer that we can make to such a question is not theoretical, but an absolute fact, thoroughly demonstrated, that under such other conditions here required, neither bond or brick has ever broken in any place, under any condition of traffic, in this country. The best brick made is easily broken by a blow much less in force than that made by the 1,000 poud horse, if such brick rest directly upon any rigid surface, and no reason exists why such brick will not be broken by the 1,000 pound horse, if thus exposed, uncushioned and rigid.

With the sand cushion properly spread upon the concrete foundation, the next thing to be considered is the provision for the expansion cushion. This must be provided for by placing next to the curb a board of sufficient width to extend above the height of the brick, which is generally four inches. In order that they may be readily drawn, it is advisable that a wedge be dropped at intervals of three to four feet behind this board and extending above it from three to four inches. The wedges should be one-half inch in thickness at the top. The thickness of this board should vary according to the width of the street, always favoring the safe side by providing sufficient thickness, ranging from 1 inch to 1½ inches. Need I expressly urge this provision? It will eliminate the longitudinal cracks, preserve the curb, and prevent the pinching from which chipping and crushing of the brick result, as well as permitting the bricks to lie thoroughly impacted into the sand cushion underneath them, so doing away with the excessive noise which brick are reputed to possess, but of which they are innocent when combined with proper elements of construction. In other words, let the brick street lie with its own dead weight upon the sand cushion, and it will neither rise up nor make a noise.

Next in order is the laying of brick in the street. Much money is often wasted to the contractor, and in some cases to the brick men, by practices that are wholly bad from an economical point of view, as well as lacking in methods assuring the best results. It is necessary that the brick be placed in the street with the best edge up. This is a rule universally required of brick construction in masonry work. In order that this shall be done, the brick should be delivered to the person who drops them into the street with tne face placed to suit the hand operation of such person, who may be called the bricklayer. This is best done by the men either bringing them in by board, or by the use of a gravity carrier. The edge of the brick that is most subjected to the action of the flame and chemical influence wrought in the burning, the chipped corner, the warped edge and extreme kiln mark should go down and not up. Any intelligent person can soon train a whole gang of workmen as to which the face edge of a brick should be. It is determined by several little factors as easily contra-distinguished as the countenance of one man is from another. The wheeling of brick over those already laid; the dumping of brick; depending on a process of turning over those not faced ought never be tolerated. The brick should not be placed in the street in close contact with one another. A few days since we saw a man with a forty pound sledge and a short piece of 2x4, driving the brick as close together as was possible to do. The specifications for this work provided for the interstices to be filled with sand. It seems to me that the observations of a child would put such methods upon serious inquiry. Such practice will necessarily result in the brick being chipped and the street ruined long before it is possible to fill the interstices with the sand sufficiently for the purpose for which sand is ever put between the brick, whatever that purpose be. I have read specifications requiring the same thing to be done where other provisions of the specifications required a cement filler. With the brick driven so close together, it is impractical, not to say impossible, to put the cement filler in the interstices.

After the brick are placed in the street, it is necessary that they should be inspected before they are rolled, for the reason that as few brick as possible snould be disturbed after the rolling. The roller with which this is to be done must be a light one, weighing from four to five tons; one that is easily handled and can move rapidly upon the surface of the brick. The

rolling should proceed from each side along the curb, working toward the center of the street; then cross, rolling at angles of 45 degrees; again rolling longitudinally and cross rolling as before, continuing this process until the brick are thoroughly compacted into the sand, so that the grade of the pavement shall be as intended, and the inequalities of the cushion ironed out by the sand being pushed up in the interstices of the brick, a condition always found in the case of properly rolled streets by an uneven amount pressed upwards in the interstices running from one-half to three-fourths and possibly as much as one inch in depth, in some cases. The rolling is often attempted with either a horse roller or an eight to ten ton steam roller. With such rollers you can not roll the street at the angle required, and invariably, both with the horse roller and the heavy steam roller, the brick will creep, and as the one edge rises an excess of sand falls in the space. As the roller comes back in such cases, the bricks ride the sand and instead of the pavement becoming smoother, it becomes rougher the more it is rolled. In case of an excessive weight coming upon the brick, they will rebound and never can be compacted, and yet both of these bad practices have, in many instances, been insistently resorted to, to the utter spoiling of the street. But after the brick are properly rolled and compacted, of course, those that have proved bad under the pressure of the roller should be removed and taken from the street. The street should then be swept clean and the brick wet down. However, this wetting down must be done only in one way, and that is by the use of a nozzle, either upon a sprinkling can or a hose, which will permit but the finest spray of water to come upon the street.

In the application of the cement filler, more incorrect and faulty means and methods are resorted to than in any other portion of the work. However, it is true that the proper method is a simple one, easily followed, and absolutely without any hazard to the street. In order that we may understand why certain directions are insisted upon in the application of the cement filler, we must keep in view the requirement necessary to the greatest strength of the filler, and that is that it must be put in place in the proportion designated in the specifications; that is, one part cement to one part sand in the first course, and two parts cement and one part sand in the last course. It is as necessary for the sand to be clean and sharp as it is that the Portland cement shall be a good quality. Too much water in the mixture is as harmful as too little. There is only one method, one practical method, that I know of for the application of this cement filler, yet many contractors will resort to other means if allowed, and rebel against the only method which is carefully laid down in the National Association's specifications numbered one, which is as follows:

"The sand should be dry. The mixture, not exceeding one-third bushel of the sand, together with a like amount of cement, shall be placed in the box and mixed dry, until the mass assumes an even and unbroken shade. Then water shall be added, forming a liquid mixture of the consistency of thin cream. From the time the water is applied until the last drop is removed and floated into the joints of the brick pavement, the same must be kept in constant motion. The mixture shall be removed from the box to the street surface with a scoop-shovel, all the while being stirred in the box as the same is being thus emptied. The box for this purpose shall be 3 1-3 to 4 feet long, 27 to 30 inches wide and 14 inches deep, resting on legs of different lengths, so that the mixtures will readily flow to the lower corner of the box, which should be from 8 to 10 inches above the pavement. This mixture, from the moment it touches the brick, shall be thoroughly swept into the joints. Two such boxes shall be provided in case the street is twenty feet or less in width; exceeding twenty feet in width, three boxes should be used. The work of filling should thus be carried forward in line until an advance of fifteen to twenty yards has been made, when the same force and appliances shall be turned back and cover the same space in like manner, except to make the proportions two-thirds Portland cement and one-third sand. To avoid the possibility of the thickening at any point, there should be a man with a sprinkling can, the head perforated with small holes, sprinkling gently the surface ahead of the sweepers. Within one-half to three-quarters of an hour after this last coat is applied and the grout between the joints has fully subsided and the initial set is taking place, the whole surface must be slightly sprinkled and all surplus mixture left on the tops of the brick swept into the joints, bringing them up flush and full. After the joints are thus filled flush with the top of the

brick and sufficient time for evaporation has taken place, so that the coating of sand will not absorb any moisture from the cement mixture, one-half inch of sand shall be spread over the whole surface, and in case the work is subjected to a hot summer sun, an occasional sprinkling, sufficient to dampen the sand, should be followed for two or three days. The first application should be thin in order that it may flow to the depth of the joints of the bricks, thereby insuring a substantial bond, and should be kept in constant motion while being applied, otherwise the sand will settle and you will have water and cement instead of water, sand and cement. The water and cement wouldn't be objectionable, but the sand by itself is wholly so. It must also be mixed in small quantities, as it is next to impossible to keep the sand in suspension when more than a common water pail of each, sand and cement, is used, and unless it is deposited upon the pavement with the sand in combination with the solution, you will get the cement and water in the lower portion of the joints between the brick and the sand without the cement in the upper portion. It is preferable, after the sand and cement have been mixed dry, to apply sufficient water and mix slowly, first to a good mortar, then add sufficient water to bring the mortar to the required consistency. By this method a more thorough adhesion of the cement to the sand can be obtained."

The following practices have come under my observation: I have seen the filler dipped from the mixing box with a bucket and carried many steps. In such case, the sand was on its way to the bottom of the bucket and the cement was making for the top. I have seen the mixture placed in a cradle or rocking box, and in the time intervening the turning of the box, the sand and cement were undergoing a like separation, and as the box was turned the richer mixture of cement flowed ahead and the weaker and sandy portion remained near the box. I have seen the water applied before the mixture in a dry state reached an even shade, thus preventing the proper adhesion of the particles. To remedy the thickening of the mixture, I have seen it entirely ruined by throwing upon the street the water from an open nozzle, which served only to float the cement away from the sand. I have seen the mixture put upon the street much faster than it could be swept in. I have seen the mixture prepared in a dry state in large quantities at intervals of a few feet upon the brick and the water applied and the sweeping-in process undertaken simultaneously. I have seen the mixture made up in such large batches that it required a sweeping of several feet before it could be made to disappear in the interstices. In such cases, the last that went in was but very little better than pure sand. I have taken a quantity of sand from the supply to be used for filler purposes and found that it contained 33 per cent. of soil. I have seen, by the use of the same kind of broom in the application of the second course as was used in the application of the first course, the filler swept out of the joints rather than left full and flush with the top of the brick, thereby insuring slight chipping of either edge of the brick in the early use of the pavement. The mere exercise of common sense would suggest the use of a rubber or leather scraper for the application of the top course, and the stroke at an angle of forty-five degrees to insure the perfect job. Thus, I might enumerate for hours the manner, method, and means of applying the cement filler in the interstices of a brick street, each and every one of which was but to insure a failure, and in none of which is economy to the contractor subserved.

I might enumerate for hours the manner, method, and means of applying the cement filler in the interstices of a brick street, each and every one of which was but to insure a failure, and in none of which is economy to the contractor subserved.

By the proper method, here insisted upon, the hoes are drawn by two workmen to the upper portion of the box and the backward flow agitates the mixture equally with that of the stroke. The lift of the scoop immediately following, the box sufficiently adjacent to the work, so that instead of a motion which pitches, it is rather a quick motion on the part of the workmen that pulls from under the mixture the scoop, allowing the mixture to strike the surface of the brick in proper proportion, thus more nearly insuring it in place in proportion than by any other known method. By the use of three boxes and a systematized force, the greatest economy to the contractor is subserved and the greatest possibility of the cement filler is attained.

The boards in place providing for the cushion should, after a lapse of twenty-four hours and sooner than thirty-six hours, be withdrawn, and

the space filled two-thirds with a pitch filler. Then finally a covering of sand, sufficient to hold moisture and protect the cement filler from extreme heat while setting, is imperative.

The street having been finished in all respects with great care and skill is sometimes entirely ruined by using it before the cement filler is sufficiently set. That this is done seems inexcusable, yet it is done sometimes by the very person who is taxed to pay for the street.

We stand for the cement filler because it meets fully all the requirements. It forms a part and parcel of the ideal brick street which no substitute can supply.

If these conclusions are correct, that our manner, method, and practice is the best and that they do not add greatly to the cost, neither are they difficult, *why are they not generally complied with?* But in asking this question again, please do not misunderstand or infer it is coming from a pessimist. On the contrary, I am exceedingly optimistic in this whole matter. In many cities and smaller towns of the middle west, the public have long since understood what they can have, and they will only have brick streets at their best. In certain cities of northern Ohio, Michigan, parts of Indiana and Illinois, are found the best examples. To such an extent is this true that at least 80 per cent. of all the pavements laid in the last two years have been brick. Nor do I believe that the municipal engineers of the country are to blame for a noncompliance with these directions in brick street building.

One reason why a compliance with the specifications and directions is not observed is that the performance of each particular step in the construction of a brick street is left to a foreman chosen by the contractor. It is almost universally so, that such foreman has his set way of doing this or that particular thing he is charged with, and rebels against an innovation in his practice. We sincerely believe that progress for betterment in this particular may be accomplished by embodying in the contract between the municipality and the contractor, as a part of the requirement, that the contractor be obliged to supply his foreman with particular specifications and directions covering such portions of tne work with which such foreman is charged. This suggestion, however, is only remedial to a degree and does not, of course, meet the difficulty in full.

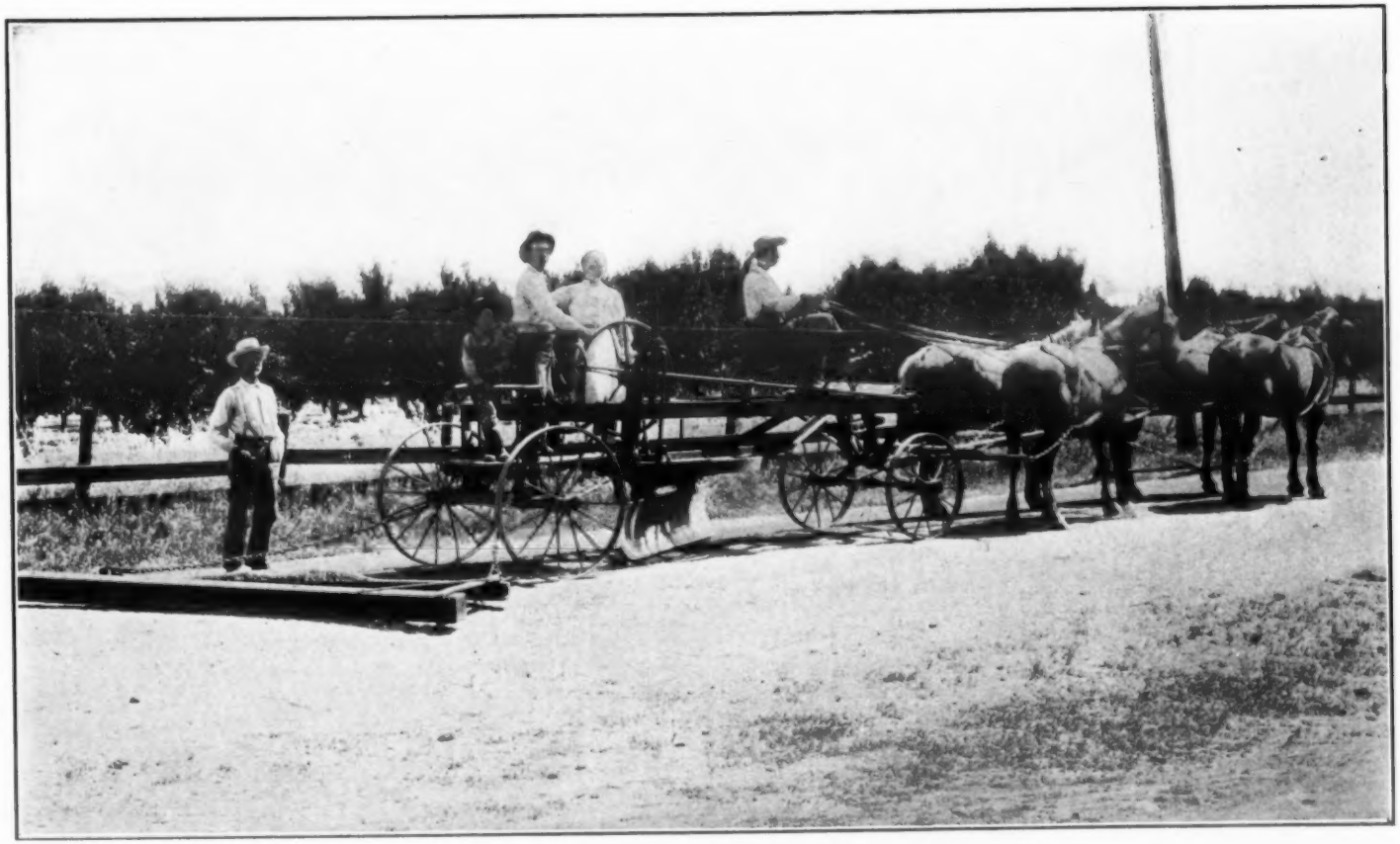
Another reason is that, in some localities, the results of a properly constructed brick street are not appreciated, because not believed in. But the question becomes interesting in the face of the fact that these specifications have been adopted in the main by practically all the progressive engineers of the country.

But the principal reason why we cannot get a more universal compliance with the approved methods of constructing brick streets is due to the American political practice of awarding minor political service by the dearest compensation possible to lay hands upon. In many cases, the man secures an inspectorship because he is fit for nothing else. The miserable practice should cease. More money is expended for streets and roads than for any other public purpose, except for the education of our children.

The architect, who plans, designs, and specifies concerning the expenditure of $50,000.00 in a building, is permitted to hire, train, and direct his superintendent. It is the exception to the rule if the municipal engineer in this country is permitted to do this thing. It should be part of the engineers' business, as much to select his superintendent and inspector as it is to design and specify. This question is one that does not relate alone to the construction of brick streets, but it permeates, relates to all municipal work, and is the one objectionable feature in the prevailing American municipal system toward accomplishing the elimination of which every broad minded citizen and tax payer should lend his influence.

SOME OILED EARTH ROADS IN CALIFORNIA.

THE California Commissioner of Highways says that no material is quite so important to road improvement in that state as crude asphaltic oil. It may be used as a dust preventive, a roof to shed the rain water from the foundation, and as a lubricant to reduce the rate of wear to the road surface. While these improvements are of vast importance when



I. YOLO, CALIFORNIA, METHOD OF TREATING OILED ROADS.
Drag Smoothing Out Road Surface After Topping with Earth.

properly handled, it must be borne in mind that only partial results, and in many cases no results, are obtained with improper application, selection, and treatment of oil.

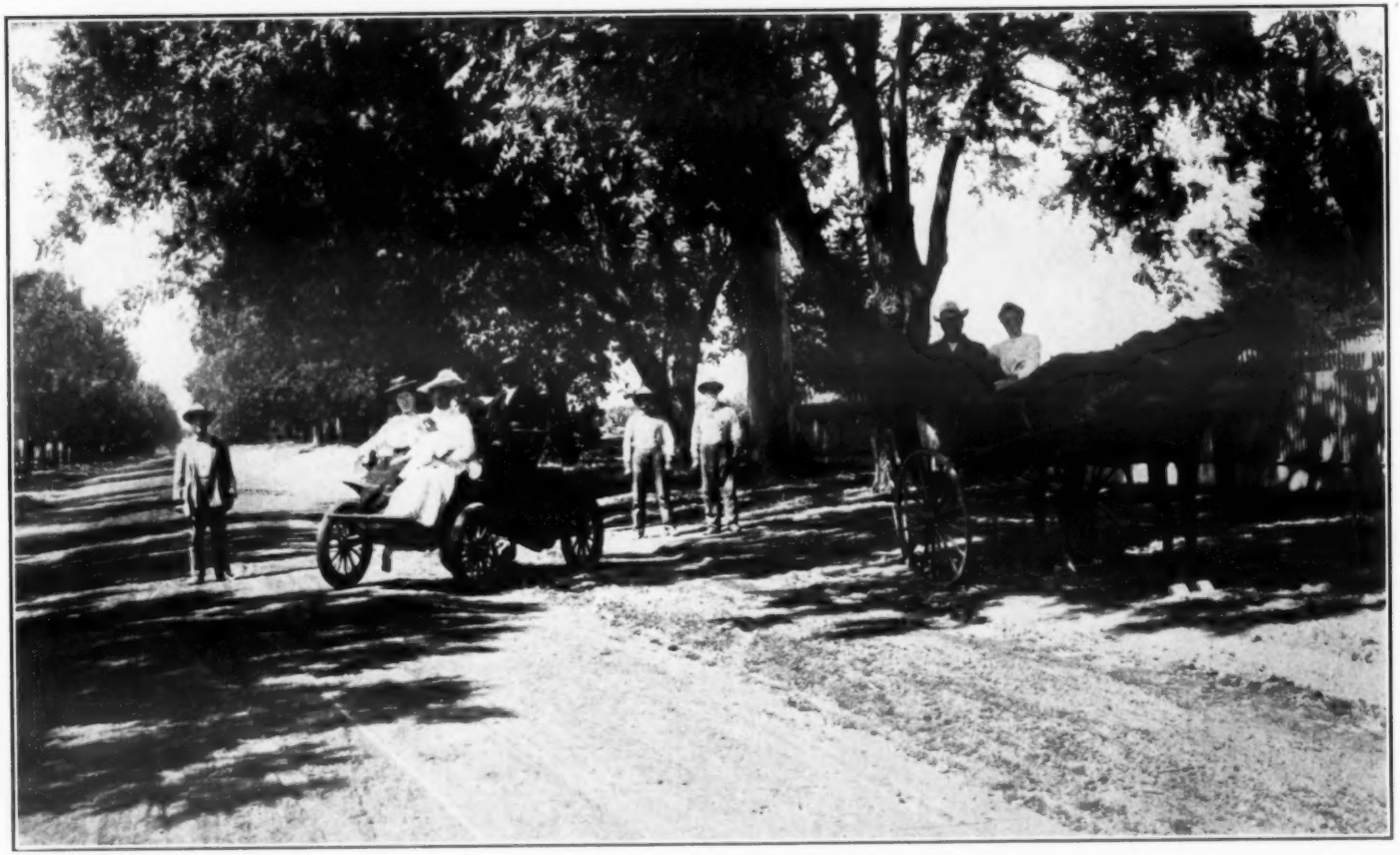
Upon inspection of oiled roads of the state it was found that no general system prevailed. In many cases, oil was applied to a rutty road, uneven and worn out, and then allowed to collect in puddles. This was labeled an oiled road. It takes but a short time to lose faith in work under such methods and it has been due to this lack of preparation and care that so many counties have discontinued the use of oil. However, such work was not found on all roads visited, as several counties of California have excellent oiled roadways. A good oiled earth highway was particularly noticed in Supervisoral District No. 2, Yolo County, where a highly intelligent use of oil may be seen on the Winters-Davisville road. Here is an earth road of splendid cross-section, prepared and oiled at a cost not exceeding $150 per mile, and creating a road at this figure fit for heavy travel as well as light vehicles. The plan followed in this work is presented as an extremely sensible and scientific solution of the problem.

The roadway is first cut out to the cross-section desired, with the crown easily decreasing in elevation to a slight gutter about seven feet from the property line, and from this point there is a rise to the edge of the right of way. The crown is not excessive, perhaps eight inches, thus giving ample opportunity for a lateral spreading of the travel. After the road is cut to a hard, even base and all weak spots remedied, oil is applied at the rate of one gallon to the square yard of surface, then the grader returns the earth, which was piled at either side of the part of road to be treaded, immediately over the oiled portion. While this is being done, a drag attached to the rear of the grader, as shown in the accompanying Plate 1, smooths the earth over the oil to a depth of four or five inches. After thorough rolling and compacting of the earth on the oil, travel is permitted on the roadway. At this point an excellent plan is used: The travel necessarily creates a rough surface, and if allowed to continue without any further work a very inferior road would result. But the grader and attached drag go over and smooth the surface as necessity requires, keeping the work in almost perfect shape. By simply repeating this process, with grader and drag, to keep the road smooth until the oil eventually comes up to the surface, an extremely hard, oiled road of earth is given. At any point, where there appears on the surface too much oil for the material, a local application of sand or earth is made. This process makes an oiled road by fully saturating the oil, giving it a body hard enough to withstand heavy travel with scarcely any indentation or drag to the tractive power.

Upon examination of many miles of oiled country roads, it was observed that soft, plastic bunches of oiled material have accumulated near the edge of the travel, showing conclusively that too much oil was used for the material involved. The use of an excessive amount of oil has given rise to the teamsters' objection to the heavy pull—an objection well sustained by experience, but one dispelled by the foregoing method of oiling.

In southern California considerable mileage of good oiled roads may be found. Riverside County employes a method very similar to the one used in Yolo County, with remarkably fine results. The sub-grade is crowned to the proper cross-section, when it is watered and rolled thoroughly to a solid even form. Upon this is placed about four inches of granite stone, found handily near, which is in turn wet and rolled until compacted. On this surface is sprinkled from one-half to one gallon of heavy asphaltic oil to the square yard. Then over this is deposited about two inches of fine granite material, enough in each instance to completely keep the oil from reaching the surface for several days. Whenever oil appears in a slight puddle on the surface it is immediately covered with fine crushed rock. This method gives a road closely resembling a bituminous macadam pavement, and one which has a wearing capacity far beyond the life of the roads treated with a top layer of oil.

The accompanying photographs show views of the roads mentioned.



II. OILED EARTH ROAD IN CALIFORNIA.

On Left, Smoothed Main Road. On Right, Surface Not Yet Smoothed.

SEPTIC TANK PATENTS.*

By Prof. A. Marston, Ames, Iowa.

SEWAGE tanks may be classified as follows:

1. Settling Tanks. These are of comparatively small size and are designed to remove sludge mainly by simply settling, though in addition some bacterial action will necessarily take place. Provision must be made for frequent removal of sludge.

2. Bacterial Tanks. These are larger, comparatively to the volume of sewage, than settling tanks, and bacterial action becomes especially prominent in them, though sludge settles out much as in settling tanks. The design and method of operation of the tank must be such as to permit the action of all three of the general classes of bacteria, including aerobic and facultative as well as anaerobic. Aerobic bacteria are those which cannot live without the presence of free oxygen, while anaerobic bacteria are those which are killed by the presence of free oxygen. Facultative bacteria can live either with or without the presence of free oxygen.

3. Septic Tanks. These are sewage tanks in which the action of all other bacteria than anaerobic is excluded. Heretofore, classes 2 and 3 of sewage tanks above have generally both been called septic tanks. The writer proposes their division into two classes as above because of the recent septic patent decision, in which one of the United States Circuit Courts of Appeals has put forth what may be considered legal definitions of the terms septic action and septic tank. To quote the language of the court: "Septic action is the action of a colony of anaerobes preventing the accumulation of solids unhampered by the presence of aerobes or oxygen or agitation." "The septic tank is the home or workshop of such anaerobic colony." With these definitions the court proceeds to rule out prior sewage tanks as anticipations of the Cameron septic process patents on the ground that they do not exclude aerobes or oxygen or agitation. For example, in the case of the Frenchman, Mouras' patents the court uses the following language: "The cesspool, therefore, described in the Mouras' patents differs materially from that described by Cameron, since it discloses no workshop for anaerobes separated from the aerobes, and maintained in anaerobic condition by the careful exclusion of oxygen and agitation." The court rules out the patents of the Englishmen—Scott, Moncrieff and Dibdin—on the ground, quoting again the exact words of the court, that "they fell short of Cameron's process, since they did not provide for having the anaerobes cultivated and worked separately from aerobes, oxygen and agitation." Concerning Muller's German patent the court says: "It is apparent that Muller had in mind both groups of bateria ——."

In the litigation over the legality of the septic patents it was alleged against the patents that anticipation was found in certain sewage tanks in America, built and used prior to the date of the Cameron patents. In ruling against this claim of anticipation, the court used the following language: "So far as their structural details are concerned, some of them at least closely resembled Cameron's apparatus: having the shallowness in comparison with other dimensions and inlet and outlet so arranged as to reduce the amount of agitation. Without stopping to consider some minor criticisms which complainants' counsel makes on these alleged anticipations, we may dispose of them in two ways. Tests for oxygen were made at all such as were still in operation when the testimony was being taken with the result that there was found at the outlets free and absorbed oxygen in quantities varying from 24 to 45 per cent., while at the Saratoga plant, embodying the Cameron process, the record for oxygen at the outlet was zero. It further appears from the testimony that of these tanks those most resembling Cameron's were all cleaned and the sediment on the bottom removed, some of them frequently, some once a month, and the one most relied upon 'at least seven times per year, and perhaps oftener.' When it is remembered that all the experts on both sides agree that it takes from six weeks to two months to produce the anaerobic conditions which Cameron prescribes for his septic tank, with the scum and deposit of the proper thickness and the condition of equilibrium established which admits of an indefinite retention of the solids, it is quite apparent that these are not Cameron septic tanks; the prescribed

*From a paper before the League of American Municipalities.

conditions are swept away by the hands of the cleaner before they reach practical efficiency. On the contrary, at Saratoga there has been no removal of sludge, and, therefore, no destruction of septic conditions for two years and a half."

Enough has been quoted from the septic patent decision, I think, to show that the portion of the patent which was sustained was so sustained because in the mind of the court there exist two kinds of sewage tanks in which bacterial action takes place: viz., septic tanks, or those which permit only anaerobic action, and non-septic tanks, or those which also permit aerobic action.

The writer, therefore, contends for the adoption of a classification and nomenclature of sewage tanks corresponding to the court's decision, Even those who believe that the decision in this case was wrong, and that it was based on mistaken ideas as to the scientific facts of sewage purification, must concede that such classification of tanks would do much to clear up the present general confusion of ideas since the decision.

Since the septic tank idea gained favor, every designer of sewage tanks, the writer among the number, has used the name septic for his tank, and apparently with good reason, for originally the word septic simply referred to bacterial conditions, just as the word anti-septic refers to anti-bacterial conditions. Since the court, hower, has legally defined septic action to refer to the action of one class of bacteria only, let us accept such definition, even

III. PALM AVENUE, RIVERSIDE, CALIFORNIA.
Four-Inch Gravel Base. Half Gallon of Oil to Square Yard. Photographed When Two Years Old.

if it be regarded as artificial and illogical.

It is impossible, at present, to state just what features of design and operation are essential to the difference between bacterial tanks and septic tanks, as such tanks are defined above. Indeed, the same tank may be bacterial or septic depending on the method of operation. It must be remembered that the apparatus claims of the septic patents were not sustained, so that there are no patents on any particular kind of sewage tank. Any municipality or person may build any kind of a sewage tank desired, and be guiltless of infringement, provided the tank is not operated in such a way as to prohibit every sort of bacterial action in it, except anaerobic. We may infer from the language of the decision quoted above, that emptying the tank upon a sludge bed once in six weeks or less, would obviate infringement. The expense of doing this would be very small, as in most plants the tanks can be emptied by simply opening a valve. In many cases the sludge could be allowed to remain without nuisance upon sludge beds, where it would largely be destroyed by bacterial action.

It was recently stated to the writer by the chemist of the Board of Health of a certain important state that chemical analyses of the effluents of most of the numerous so called septic tanks in that state had shown free oxygen present at the outlet. This arouses a query as to whether or not similar conditions may be found elsewhere. Evidently this matter should be thoroughly investigated in each state, for from the language of the court decision quoted above, the layman, at least, would judge that such tanks are not infringements on the septic patents.

Careful and extensive scientific investigations of existing sewage tanks are badly needed to determine just what features of design and operation will or will not permit the presence of aerobic organisms or free oxygen in the effluent. The Engineering Experiment Station of the Iowa State College is planning to attempt such investigations, with what result remains to be seen.

The most important sewage disposal development during the past year has been this decision of the United States Circuit Court of Appeals, partially upholding the validity of the Cameron septic patents. The most prominent question in sewage disposal before American municipalities today is that of possible infringement of these patents. Many towns have before them claims for past infringements to fight or settle. Such towns as propose to build almost any kind of a sewage tank must face the practical certainty that royalty claims will be made. In the case of Baltimore, if the royalty is figured on the basis of 5 per cent. of the entire cost, which is the basis on which licences are being offered other cities, the royalty would amount to over $160,000 for that one case, although the entire estimated cost of the tanks proposed for Baltimore is only $200,000.

It is not too much to say that sewage disposal is just now in great danger of as complete an arrest, till this question is settled, as was experienced with paving a few years ago, when the United States Courts overthrew the old assessment laws. Then for two or three years almost no paving was constructed in Iowa.

The question is so important that I shall attempt to present to you a brief review of the present situation.

HISTORY OF PATENTS.

The original septic patents were granted in England, in 1894 and 1895, I believe, to Mr. Donald Cameron. The first of these patents expires in November, 1909. A United States Patent was granted to Mr. Cameron October 3, 1899 (applied for March 15, 1897), and necessarily expires at the same time as the English patents, or, presumably, in November, 1909, unless its life shall be extended by a special act of Congress. It is generally understood that the Cameron Septic Tank Company will apply to Congress for such an extension of the life of the patent.

The statement has been made, and, though I cannot personally vouch for its accuracy, I have not seen it contradicted, that practically no royalties have been paid on the Cameron patents in England, where they were originally granted, although many sewage tanks have been built there which are popularly called septic tanks.

In America the existence of this sewage patent and of others of less prominence granted to other parties has all along been generally known, but practically all municipal officers, attorneys, and engineers who have had to look into the matter have sincerely believed that the so-called septic process was not patentable, but was simply a not new application of natural process which have been used by man from almost the beginning of human life for the destruction of organic wastes. The writer frankly confesses to have been one of the engineers who

IV. MAGNOLIA AVENUE, RIVERSIDE, CALIFORNIA.
Four-Inch Gravel Base. One Gallon of Oil to Square Yard. Photographed When One Year Old.

has designed sewage tanks called septic tanks, believing that the Cameron sewage patents and the others referred to were invalid. One city attorney, in a letter to the writer, stated that if these patents should be upheld he would undertake to get a patent sustained upon the process of drying clothes by hanging them on the line.

Scores, perhaps hundreds, of American municipalities, therefore, proceeded to build sewage tanks of many and varied designs, planned by many different sanitary engineers, without paying royalties, and all such tanks have been called septic tanks, because their efficiency depended on bacterial agencies.

The Cameron Septic Tank Company finally brought suit against the village of Saratoga Springs, N. Y., for infringement. In the United States Circuit Court the village won a complete victory and all the claims of the patents were declared invalid. Thus the city attorneys and other officers, and the engineers, who believed, and still, perhaps, believe that these patents should be held invalid, have the company of most eminent legal authority.

In the United States Circuit Court of Appeals, however (Second Circuit), the opinion of the lower court was partially reversed, and as the Supreme Court of the United States has refused to consider an appeal, this decision stands as that of the highest court, which it would presumably be

difficult to overthrow in another circuit.

OUTLINE OF SEPTIC PATENT DECISION.

The decision of the Court of Appeals declares invalid eight claims, known as the apparatus claims, and upholds five claims in the patent, known as the process claims. It is legal, therefore, to build any kind of a sewage tank. It is not legal, however, so to use that tank as to employ the septic process as such process is defined by the court.

The exact nature of the claims which are upheld may better be understood by quoting them:

"1. The process of purifying sewage which consists in subjecting the sewage under exclusion of air, of light, and of agitation to the action of anaerobic bacteria until the whole mass of solid organic matter contained therein becomes liquefied, and then subjecting the liquid effluent to air and light.

"2. The process of liquefying the solid matter contained in sewage, which consists in secluding a pool of sewage having a non-disturbing inflow and outflow, from light, air, and agitation until a mass of micro-organisms has been developed of a character and quantity sufficient to liquefy the solid matter of the flowing sewage, the inflow serving to sustain the micro-organisms, and then subjecting said pool under exclusion of light and air and under a non-disturbing inflow and outflow to the liquefying action of the so-cultivated micro-organisms until the solid organic matter contained in the flowing sewage is dissolved.

"3. The process of liquefying the solid matter contained in sewage, which consists in secluding a pool of sewage having a non-disturbing inflow and outflow, from light, air, and agitation until a mass of micro-organisms has been developed of a character and quantity sufficient to liquefy the solid matter of the flowing sewage, the inflow serving to sustain the micro-organisms, then subjecting said pool under a non-disturbing inflow and outflow and under exclusion of light and air to the liquefying action of the so-cultivated micro-organisms until the solid organic matter contained in the

V. BROCKTON AVENUE, RIVERSIDE, CALIFORNIA.

Four-Inch Macadam Base. Half Gallon of Oil to Square Yard. Photographed When Two Years Old.

flowing sewage is dissolved and then subjecting the liquid overflow to an aerating operation.

"4. The process of liquefying the solid matter contained in sewage, which consists in secluding a pool of sewage having a non-disturbing inflow and outflow, from light, air, and agitation until a mass of micro-organisms has been developed of a character and quantity sufficient to liquefy the solid matter of the flowing sewage, the inflow serving to sustain the micro-organisms, then subjecting said pool under a non-disturbing inflow and outflow, and under exclusion of light and air to the liquefying action of the so-cultivated micro-organisms until the solid organic matter contained in the flowing sewage is dissolved, then subjecting the liquid outflow to an aerating operation, and then to a filtering operation.

"21. The process of liquefying the solid matter contained in sewage, which consists in secluding a pool of sewage having a non-disturbing inflow and outflow from light, air and agitation until a thick scum is forced on the surface thereof and a mass of micro-organisms has been developed of a character and quantity sufficient to liquefy the solid matter of the flowing sewage, the inflow serving to sustain the micro-organisms, and then subjecting said pool under the cover of said scum and under a non-disturbing inflow and outflow to the liquefying action of the so-cultivated micro-organisms until all the solid matter contained in the flowing sewage is dissolved."

On their face, the above claims seem broad enough to cover almost any kind of a sewage tank which would be apt to be built, and I believe I am correct in saying that demands for royalties have been made in nearly all cases where sewage tanks are publicly known to have been built since the septic patents was applied for in 1897. However, these claims must be studied in the light of the entire decision.

I have already quoted quite extensively from the language of the court decision. I personally believe that these quotations justify two statements, though I make them with the diffidence of a layman in legal questions.

VI. NORTH ORANGE AVENUE, RIVERSIDE, CALIFORNIA.
Photographed When Two Years Old.

First, The claims upheld were declared valid on the ground that certain prior sewage tanks were not anticipations, and hence any tank closely on the plan of these prior tanks in design and operation will not be infringements.

Second, The claims upheld were declared valid on the ground that what the patentee first invented and applied was the idea of excluding all but anaerobic action in a sewage tank, and hence tanks which do not, by their design or method of operation, exclude agitation and the presence of free oxygen and aerobes at the outlet will not be infringements.

ROYALTIES AND LICENSE FEES.

The writer does not know that the Cameron Septic Tank Company has made any general offer of settlement with municipalities having sewage tanks claimed to infringe. Instead, the writer understands that each case is reserved to be dealt with separately. However, in a number of cases known to the writer, claims for royalty are made on basis of a license fee of 5 per cent. of the entire cost of the plant, including filters as well as tanks, plus a penalty for past infringements of 3 per cent. per year since the plant began operation.

For licenses for new plants the company has asked a license fee of 5 per cent. of the entire cost, this fee not to include furnishing any plans and specifications.

The royalties, penalties, and licenses are claimed on the cost of the filters, in addition to the cost of the tanks, because, although the patentee did not claim to have invented a filter, he did include in his claims the filtration of the effluent of a septic tank.

SEPTIC PROCESS PROTECTIVE ASSOCIATIONS.

Except in the case of very large plants, like those at Baltimore and Columbus, the cost of defending an infringement suit would be greater than the cost of settling the same on the basis of the claims of the Septic Tank Company. Hence, it must be apparent that without some organization, all municipalities having sewage tanks would practically be at the mercy of a strong company making royalty claims, whether these claims were just or not.

On this account, two septic process protective associations have been formed. The first organized has its headquarters east of the Mississippi River, the President being Mr. Herbert Snow, of Philadelphia, and the Secretary, Mr. R. Winthrop Pratt, Columbus, Ohio.

The other organization is of a more modest nature and includes the towns of Iowa having sewage tanks, and a few members from adjoining states. Mr. F. L. Anderson, Marion, Iowa, is secretary, and the writer has the honor of being chairman.

Speaking for this organization, the writer can say that its aim is simply the securing of justice and fair treatment all around. If, at any time, we become convinced that the tanks owned by the members of our organization really are infringements of a valid patent, we shall endeavor to settle all claims for royalty and infringement on a basis fair to all concerned.

On the other hand, until we are convinced, the members of our organization consider it their duty to resist the collection of such claims.

EXTENSION OF SEPTIC PROCESS PATENTS.

It is evident that the extension of the septic process patents by the coming Congress is going to be a matter of the utmost interest and importance to all American municipalities. I earnestly call the attention of all members of this society to this important subject. It is our duty to see that absolute justice be given to the holders of this patent, and on the other hand, if the septic process should not, in real justice, be considered patentable, then it would be perfectly proper to resist the extension by Congress of this patent. In case the statement which has been made is correct, that royalties have not been collected in England for the patent, it would hardly seem proper for the United States to extend its life and compel American municipalities to stand tax not imposed in the country in which the patent was originally granted. I cannot, personally, say whether this report as to the payment of royalties in England is correct or not.

PRACTICAL RESULTS OF THE MUNICIPAL CONTROL OF SHADE TREES.*

By William Solotaroff, Secretary of Shade Tree Commission, East Orange, N. J.

IN the State of New Jersey more than a dozen cities have now established shade tree commissions. Among these are Newark, Passaic, East Orange, South Orange, East Rutherford, Camden, Jersey City, Morristown, Plainfield, Ridgewood, and Perth Amboy. The State of Pennsylvania last year passed a law drawn after the New Jersey statute, providing for the establishing of shade tree commissions in municipalities. During the last few years our commission has received scores of letters from cities all over the country, asking for information regarding our organization and methods of work. These things show that the matter oh handling of the street trees is one of the most important municipal problems of today.

Briefly, the advantages of well shaded streets may be considered under three heads, from the esthetic, sanitary and economic standpoints. In these days, when so much is being done to bring about the realization of the city beautiful, shade trees play a very important part. No city in America possesses such avenues of fine shade trees as the city of Washington. While visitors admire the fine public buildings, everyone will admit that the chief attractions of Washington are the beautiful avenues of shade trees, which make it one magnificent park. From the viewpoint of health we need but recall a few well known facts. Trees help to purify the air by absorbing the carbonic acid gas that is exhaled by man and giving back the pure oxygen that he needs. Trees also help to modify the temperature of our streets. The normal heat of a summer is still further intensified in cities by the reflection from the pavements and the buildings. The economic value of shade trees is inestimable. They are among the first things that impress a stranger in forming a judgment as to whether a city is or is not a good place to live in. At this time, when from all the large cities people are flocking to the suburb, there is a great desire to make these places as country-like as possible. The intelligent selection of tree species, their planting and care become as important as other improvements.

It will be a very easy matter for you who are concerned with municipal matters to picture in your mind a street or a number of streets in your city where the system of the individual control of trees exists. What picture does such a street present? There are long stretches that are not planted at all. The trees that have been set out bear evidence of the diversity of taste of the planters. There are half a dozen or more species of trees on the street, undesirable mixed with desirable, of all shapes and sizes, set either too close or too far apart. In some cases the trees are not trimmed at all and the limbs are so low that they touch the heads of pedestrians; in others they are pruned too high. The trees have been left unprotected by guards, many of them have been bitten by horses and there is evidence that they have been injured by destructive pests.

Especially in the control of insects, which infest certain species of trees from time to time, the system, or rather the lack of system, of individual care of street trees utterly fails. The citizen is entirely powerless to accomplish anything. His efforts come to naught if his neighbor allows the pest to remain on his trees. In the extermination of insects in a city it is absolutely necessary that all the infested trees be treated in order to obtain effective results. It is impossible to have concerted action on the part of thousands of people of a community in the treatment of infested trees at the same time. Insect fighting requires persistence, and a knowledge of what to do at the proper time to obtain results. There is a period in the life history of every one of our tree pests when it may be most easily destroyed. This stage is not always at the time when the most injury is apparent, or when the average citizen wakes up to the necessity of doing something. The life history of the pests must be known in order that treatment may be given at the right

*A paper before the American Society of Municipal Improvements.

time. Besides to spray trees of considerable size requires an apparatus, which the average citizen cannot be expected to have.

The inadequacy of the plan of leaving street trees to the control of individuals is becoming generally apparent, and a great many cities are striving to inaugurate a system which will place the street trees under the control of one official, or a commission, or other organization. Among the cities of this country which offer good examples of the successful results of the municipal control of street trees are Washington, where for more than a quarter of a century the street trees have been under public control. The charter of Greater New York placed the planting and care of shade trees in the hands of the park departments. Other cities have city foresters or committees of members of the common councils to look after the trees.

The best solution by far of the problem of the planting and care of shade trees is provided by a law of the State of New Jersey, of 1893, and a law of the State of Pennsylvania, of 1907. These acts provide for the establishing of commissions to take charge of the planting and care of shade trees on the highways of the municipalities of the respective states. These commissions are composed of three members, appointed for terms of three, four, and five years, and serve without pay. It is optional with the governing body of any city whether these acts shall have effect there. When, by resolution of the city council, it is decided that the law shall become operative in a city, then from that time all matters pertaining to shade trees are placed in the hands of the respective commissions. All work is carried on in a systematic way, and trees are planted, pruned, sprayed and removed, under direction of the commissioners. As practically operated the commissioners serve as an organization and they employ a professional forester, who has charge of the executive work. Wherein these commissions differ from other similar bodies, is that they have the power of initiative in the matter of planting; they decide that a certain street is to be planted and determine on the species of tree. An advertisement of the intention to plant is inserted for two weeks in any public newspaper and all persons interested in the improvement are given an opportunity to be heard. After the work is done the commissioners meet and certify a list to the receiver of taxes, on which are given the names of the owners in front of whose property trees were set out and the cost of the work. These assessments are entered by the receiver of taxes on the annual tax bill and are paid the same as any other legal lien. The cost of pruning, spraying, removing dead trees, and repairing old ones is provided for by a general appropriation.

Amendments of the years of 1905, and 1906 to the New Jersey act of 1893, give the shade tree commission the power to pass, enact, alter, amend and repeal ordinances relating to the planting, protection, regulation and control of shade trees, and to prescribe fines and penalties for the violation thereof. These amendments also provide that the parks in cities having shade tree commissions shall be placed under their control. These provisions are also embodied in the Pennsylvania act of 1907. The shade tree commissions of East Orange and Newark have passed ordinances relating to trees and these are being enforced in the two cities.

The commission in our city began active work in the spring of 1904. Since that time about 2,700 trees have been planted. The species used were the Norway maple, the sugar maple, the red maple, the European linden, the American linden, the pink oak, the red oak, the Oriental plane, the gingko, and the ash. Only one species of tree was planted on a street. These were set at uniform distances apart, averaging about thirty-eight feet, and all trees were supplied with wire guards. The advantages of such a system of planting can be readily seen. In selecting the proper species of trees for street use, hardy trees are taken, of symmetrical shape, of well filled head, neither too open nor too compact. By placing the trees at proper distances apart on the street, each tree is allowed to develop its characteristic beauty, and when matured, there is sufficient space between the outstretching limbs for the admission of light and the free circulation of air. Streets that have become famous for their beautiful shade trees, both in this country and abroad are planted with one species of tree. This plan is followed in Washington, where some of the most notable streets are East Capitol street, planted with American Elms; Indiana avenue, planted with Oriental Planes; Massachusetts avenue, planted with American Lindens, and other streets.

Setting out one species of tree on a street can be done only when one man

or one body lays out the street as a unit and selects a tree that is best adapted for the width of the street, the condition of the soil and the nearness of the houses to the street line. By placing guards around all trees when they are set out, all injury from horse bites is prevented. Such a system has been followed in East Orange.

The first cost of planting shade trees is very small, compared with the other assessments for street improvements. It costs the abutting property owner on the average about $3.85 per running foot for the macadamizing of a street having a thirty foot roadway, for the guttering, curbing, and laying of a 4-foot sidewalk. The distance at which street trees are set is about forty feet. Last year the assessments of the shade tree commission of East Orange for furnishing and properly planting a tree, staking it and supplying it with a wire guard, were $3.75 per tree. This makes the tree assessment less than two and a halfdfour ment less than 2½ per cent. of the cost of the improvement of the roadway proper. While the use of the road will cause it to deteriorate and it will need repairs, the trees, when properly cared for, will thrive and grow. Their first cost of setting out will become insignificant with their increased value a number of years after planting.

The choice of the proper species of tree becomes an important factor in contibuting to the beauty of the street. Ordinarily when a man goes to a nursery to buy a tree he says, "I want a tree that will grow rapidly and give immediate shade." The result is that the nurseryman will give him a Carolina poplar or white maple, which are the most undesirable trees for street use. Their planting is usually prohibited in cities having shade tree commissions. The Carolina poplar grows very rapidly, in fact, in a short time it becomes too large for the average street. As a result it is repeatedly cut back in order to force it to assume a medium sized head. The planter tries to counteract, shortly after planting, the very characteristic which recommended its first choice as a shade tree. The result is an abnormal tree, with a thick trunk and a small head. When this pruning continues with a great degree of severity the poplar become ugly and repulsive. The roots of the poplar are also an undesirable feature, for the fine rootlets fill up sewer pipes and stop the flow of water, and the larger roots lift up flags and put the curbing out of line.

In the matter of the choice of trees there is a popular notion that oaks grow slowly and for that reason these trees are not planted. People will say that it takes a life time for an oak tree to reach any considerable size. Such an idea is easy to overcome by showing what oaks will do when properly planted and cared for. Some of the finest streets in the city of Washington are planted with oaks, notably Pennsylvania avenue, planted with pin oaks, and Twelfth street, planted with red oaks. In the city of East Orange some streets were planted with pin oaks four years ago and they have grown in many cases even more rapidly than the other species, with the exception of the Oriental plane.

There are about seventy miles of streets in East Orange. The trees on about forty miles of those streets were pruned under the direction of the shade commission since its organization. In this work, too, the street was treated as a unit. All trees were pruned to a uniform height, a height that would permit the unimpeded passage of vehicles and would allow all street lights to be seen at night.

Few things are more important in the care of trees than proper pruning. The cut should be made close to and even with the trunk. When pruning is properly done the scar will heal. When short stumps are left they dry and rot, prevent the wound from healing and carry decay into the tree.

A matter that is neglected when trees are left to the individual to look after is the placing of guards around them. Of all mechanical injuries to shade trees, those by horses are most fatal. On any street having trees may be found scores of examples of trees which have been barked by horses. The annual layers of wood fail to cover up the portion where the bark had been stripped. The exposed wood dries, checks, moisture causes it to rot and the decay is soon carried to the heart of the tree. Newly planted trees in East Orange are provided with uniform wire guards and the trees are staked to keep them upright until the roots take firm hold of the ground.

The preservation of existing old trees is even of greater importance than setting out new ones. The lack of care of trees in the matter of placing guards around them, the leaving of short stumps in pruning and other neglects cause mutilations of the trunk and stems of trees that need atten-

tion. Tree surgery therefore forms one of the important divisions of the care of trees. Cavities in trees, no matter how caused, are thoroughly cleaned of all decayed wood, painted with tar, and filled with cement. It is a process very much similar to that of filling teeth. small cavities are filled with the usual cement mixture of one part of Portland cement to two parts of sand. In the case of larger cavities, bricks and stones are used to retain the concrete and the result is that a strong masonry column is erected within the hollow tree and it is thus strengthened. The filling follows the contour of the tree; but the cement is not filled flush with the outside bark of the tree, but is filled up to the line separating the bark from the first layer of wood, so that the new growth of wood will form a callous around the border of the filled cavity and in time the bark will roll over the cement and cover it entirely, leaving no trace of the cement exposed.

The most important work by far in the care of trees is the extermination of the insect pests that annually threaten to injure and destroy our trees. From the time the leaves put forth their foliage in the spring until the fall there is the cry from all parts of the country: "Can't something be done to save our trees?" The annual destruction of trees by insects is enormous. If they are not entirely killed they are defoliated by caterpillars and lose their usefulness for a season. During the four years that the Shade Tree Commission of East Orange has been organized the following pests have been successfully controlled: The Tussock moth, attacking the American elm; the American linden, the white maple and the horse-chestnut; the Cottony Maple Scale, attacking the white maple; the Wooly Maple Scale, attacking the sugar maple; and other insects. As far as possible the idea borne in mind was to fight the insects before they developed and hence before great damage was done. The Shade Tree Commission has a power sprayer by means of which the tallest tree can be sprayed.

The paper was accompanied by many lantern slides illustrating all the points presented.

THE MUNICIPAL ACCOUNTING SYSTEM OF ATLANTIC CITY, N. J.*

By A. M. Heston, Comptroller.

I VENTURE to say something, at this time, about the method of accounting devised by me and used successfully in Atlantic City. Scarcely ever has a chain been forged without a flaw in its links. The Atlantic City chain of accounts had some flaws, which were happily discovered and the links discarded.

As the warrant books, or rather the stubs of the warrant books, show the original enteries, I will first describe the method of drawing and issuing warrants. All warrants, excepting those of the Water Department, Board of Education and Board of Health, originate in the comptroller's office, and are signed by him after the respective claims have been approved by the proper committee of Council and the mayor, and after they have been audited by the comptroller. All other warrants are countersigned by the comptroller. In most other cities all warrants are drawn by the city clerk, or by the department having charge of a particular fund, and are duly countersigned by the comptroller.

The Atlantic City warrants are applied to the bills or pay rolls by two clerks, or by the comptroller and one clerk, before they are signed. In that way the work of two clerks is checked up by one clerk and the comptroller, and after the warrants have been cashed by the city treasurer they are again applied to the treasurer's cash book and to the stubs by two clerks, neither of whom is permitted to draw any warrants. The work of the office is so arranged that four clerks, including the stenographer, check against each other. Mistakes are thus eliminated and fraud made impossible, without collusion between at least four persons.

Before a warrant leaves the comptroller's office it is scheduled in duplicate and the duplicate sheet is filed with the treasurer. As the warrants

*From a paper before the American Society of Municipal Improvements.

are redeemed by the treasurer they are checked off his list. Every warrant issued is credited to the treasurer's account, as if already paid, and in that way we have a correct record of his net cash balance.

Our books are arranged to show, at a glance, the amount received to date for current taxes, delinquent taxes, liquor licenses, mercantile licenses, fines, costs, permits, interest on taxes, costs on taxes, the proceeds of bonds and every other separate source of revenue; also, the ordinary expenditures classified by appropriations, and the extraordinary disbursements subdivided; the revenue and expense to date, condition of the sinking fund, the cost of schools, the receipts and expenditures of the Water Department, Board of Helath, and so on. The accounts are so kept that we can also show at a glance how much has been paid to any individual who has done business with the city, either in the way of supplies, repairs, or improvements; for salary or for sundries. These payments are all classified by appropriations on the individual ledger, and the penciled footings show the actual amount paid to date to every individual on account of a particular appropriation. These penciled footings must agree in the aggregate with the footings on the warrant book stubs and with the expenditures as shown on both the day book and general ledger. Thus we have a fourfold record and check on accounts, kept by the general bookkeeper and the warrant clerk.

In some respects our system of bookkeeping may be unlike that of any other city, but I feel justified in saying that it is a fairly good one; otherwise we could not prepare from our record a report that is approved by the taxpayer, the accountant, and the statistician—one that has been forwarded, upon request, to a considerable number of officials and accountants in other cities.

Our books consist of twenty-four warrant books—one for each important appropriation—day book or receipts and expenditures, journal, general ledger, special ledger, individual ledger, sinking fund cash book and ledger, coupon book, revenue and expense book, license book, permit book, and a few other minor books of record.

The day books of receipts and expenditures and the general and special ledgers have been pronounced models by the special agents from Washington, who have visited the office a number of times.

Recurring to the subject of municipal accounts in general, may I not suggest that the advocates of uniformity do not attempt an elaborate system of bookkeeping to supplant existing systems, but that they confine their efforts to devising a practical scheme for summarizing the accounts of any city, whatever its system of bookkeeping, in the form of a model comptroller's report? This is what we are trying to do in Atlantic City. We have our own system of bookkeeping—different, perhaps, as I have said, from that of any other city in the country—and we are trying to get results.

I wish to speak briefly on another subject affecting municipal finance. According to statements made by government agents, the reports of comptrollers and auditors and verbal statements by officials who have visited our office, Atlantic City has a feature in municipal financing that is unknown in the other important cities of the country. In this city we never have any "outstanding warrants." I mean by this that we never have any warrants issued and outstanding for a number of months, or years, as is the case in many other cities. Occasionally a warrant may be held a month before presentation at the bank or treasurer's office to be cashed, but ordinarily all warrants are redeemed within ten days from the date of issue. If the city is short of cash, we borrow from the banks, offering uncollected revenue as collateral, and we pay all bills within two weeks after approval, with warrants that may be cashed immediately. In my opinion, a city has no more right to issue a warrant, registered or unregistered, without having the funds on hand to cash the same, than has an individual to sign his check with no funds in bank. A well-governed city should have a credit that would enable it to borrow all necessary funds to meet current expenses, by pledging its uncollected revenue as collateral. Warrants registered for payment at some future time should be unknown.

At the beginning of each week the treasurer of Atlantic City receives the cash collections of the several departments for the preceding week, and on the same day they are charged against him on the books of the comptroller. To that end, each department is required to make a duplicate report to the comptroller, and at the

end of each year these weekly reports are bound together—each department by itself—and thus constitute a part of the city records. The treasurer's accounts are audited once a month, and the weekly reports, filed with the comptroller, are checked against the treasurer's accounts.

All licenses and permits issued by the building department, highway department, electrical department, mercantile appraiser, and board of health must be countersigned by and filed in duplicate with the comptroller. A daily record of these licenses and permits is kept by the comptroller, so that we can tell, at any time, just how much money has been collected by a department, and how much has been paid at that department to the treasurer. Should there be any discrepancy at the end of the month the proper department is notified and the mistake corrected. A record of all licenses and permits is kept by the comptroller in suitable books, one for licenses and one for permits.

Once a month the various city depositories—the five national banks and three trust companies—certify to the comptroller the cash balance of the treasurer, and this must agree with the balance shown on the books of the comptroller, after making due allowance for any unpaid warrants.

Our day books and ledgers are in columnar form, whereby we can show at a glance the source of all cash received and the application of the same. This system has been found so simple and practical that by comparing a day book—say the day book of receipts—with the debits on our ledger account against the treasurer, we can tell at once whether there is an error in the account. If an error exists, it is soon brought to the surface.

Our books were designed for the purpose of preserving the classification and integrity of the accounts. Every year stands by itself. The only thing that goes over is the balance in the treasury. All appropriation balances lapse at the end of the fiscal year, and the new appropriations cover the estimated expenses of each department for the ensuing year. Of course, there may be transfers from one appropriation to another during the year.

I have referred particularly to the fact that Atlantic City has no warrants outstanding longer than two weeks, and no balances of appropriations carried over from one year to another, because a system that is opposed to ours seems to be countenanced by some well-known certified public accountants, including Mr. Richard M. Chapman, of New York. With due respect to Mr. Chapman, I claim that such a system is inadvisable, unnecessary and wrong. It can have no place in the ideal system of municipal accounting. I reject it as I do the proposition advanced by another gentleman, Mr. H. L. Austin, of Catskill, N. Y., attorney and accountant for the New York State Comptroller, who says that the annual interest charges on bonds issued for the building of a school house, or other public building, should be added to the cost of the building. This is equivalent to saying that a citizen who owns a house, mortgaged for $10,000, on which he pays $500 interest each year, increases the cost of his house at the rate of $500 annually. If Mr. Austin's position is tenable, Atlantic City, with her six thousand school children and her ten school houses, is about entering upon another public improvement, involving a capital outlay of $412,000, for which she will have only a school building worth $160,000. That is, after we have paid for this $160,000 building with the proceeds of bonds, maturing in thirty-five years, we must add to the cost the interest charges of $252,000 during the life of the bonds. Meantime, if we should lease another building, equally as good as the other, our current expense account will be increased annually to the extent of at least $12,000 for rent. In thirty-five years this will amount to $420,000. It is plain enough to me that the item of interest, like the rent, is a charge against current expense. In the one case we pay out $252,000 for interest and have a school house; in the other, we pay out $420,000 for rent and have nothing in the way of capital asset. As the bonds must be retired at maturity, the sinking fund charge of about $2,500 annually is properly a charge against capital outlay.

In stating this proposition, opposed to that of Mr. Austin, I do not lose sight of the fact that Mr. Allen R. Foote, of Columbus, O., an author of books on municipal problems, says that interest on investment should be considered an item of cost. I do not understand him to say that this applies to the case of a school house or city hall, which constitute a capital asset of the city. Mr. Foote apparently refers to money borrowed in a business enterprise, since he says: "Persons engaged in any kind of business who fail to calculate interest on their

investment, as a part of cost, deceive themselves as to the cost of doing business."

Getting back to the subject of warrants, I assert that it is unwise and unnecessary for a city to issue warrants and register them for payment at some future time, six months or a year, or, perhaps, five years. To be sure, the warrant is thus converted into a promissory note, instead of a check, but what sense is there in a city issuing promissory notes to meet current expenses? Does a reputable business man issue his check with no funds in bank? Does he write on his script, "this check good six months from date?"

Every well-governed city, if so disposed, can have the cash to pay all bills promptly and can honor all warrants the day they are issued. If for any reason the city hasn't the cash, it should borrow from the banks or brokers, and pledge the anticipated revenue as security for the payment of the notes, bonds, or levy certificates.

Unfortunately, in most of our American cities the amount of unpaid personal taxes is so large as to cause a scarcity of cash at times. This indicates a faulty system on which the taxes were originally predicated, a system of which Atlantic City is one of the many victims. In this city, on September 1st, the delinquent taxes on realty for the last ten years amounted to slightly more than $200,000, and for the same period the unpaid personal taxes amounted to $150,000. In other words, while the assessed personal and realty tax is as 1 is to 13, the unpaid personal and realty tax is as 1 is to 1 1-3. A similar condition exists in other cities, and as most personal taxes are uncollectible after two or three years, it would seem to be a wise plan to wipe the over-due accounts off the books.

In conclusion, I venture to re-state a plan whereby any city may do business advantageously on a cash basis. Every year, after the appropriation ordinance is passed, the governing body, usually the City Council, may authorize the printing of tax levy and license certificates, or revenue bonds, equal in amount to the appropriations. Once a week or once a month, as the cash may be needed for current expenses, the delegated authority, say the finance committee, may sell to the banks or brokers, or to the sinking fund of the city, a sufficient number of certificates to supply the required amount of cash. This course may be pursued throughout the year, and as the taxes and licenses are paid into the treasury the money, instead of being spent for current expenses, may be used to redeem the certificates.

If such a plan were adopted in Atlantic City, the sinking fund could purchase the entire issue of a million and a half dollars worth of bonds, covering one year's expenditures, and the plan, I am sure, would prove advantageous to the city as well as to the sinking fund.

At the end of the year, if there should be any unredeemed bonds, by reason of unpaid taxes or licenses, the amount of these bonds could be placed in the new budget, or they could be carried as a liability until the anticipated revenue is collected. The first method would add a few cents to the tax rate, but it would have the advantage of retiring the bonds sooner than by waiting for the taxes to be collected.

This plan of raising cash for current expenses also offers an additional safeguard against incurring expenses in excess of appropriations. The total amount of revenue bonds would equal the total appropriations, and the total amount of cash received would also equal the appropriations. When the money is all gone, the appropriations are, of course, exhausted, and the overworked comptroller can then take a rest.

A MUNICIPAL FRANCHISE IS A VALUABLE ASSET AND SHOULD BE SO TREATED.*

By I. R. Breen, City Attorney, Watertown, N. Y.

A FRANCHISE is defined by Blackstone as a royal privilege or a branch of the king's prerogative subsisting in the hands of a subject. The Supreme Court of the United States has defined a franchise as a special privilege conferred by the government upon an individual or corporation, which does not belong to citizens of the country generally by

*From a paper before the American Society of Municipal Improvements.

common right. Webster defines a franchise to be a particular priviledge conferred by grant from a sovereign or a government, and vested in individuals; an immunity or exemption from ordinary jurisdiction; a constitutional or statutory right or privilege.

It is quite essential to the charter and nature of a franchise that it should be a grant from a sovereign or governmental authority. The authority which we are to consider in this paper is the municipality and the franchise, or franchises which such municipality has power to grant. The only substantial asset which a municipality, known as a city, has, is its franchise, commonly known as gas, electric light, water and street railway franchises, and these franchises are so pertinent to the growth and prosperity of a city, whether large or small, that they lie at the very foundation thereof and their great value is difficult of estimation. These franchises, properly developed, become great arteries of life, happiness and prosperity, but when negligently and improvidently operated and controlled, they stifle the prosperity, growth, comfort and well-being of a municipality. Therefore, that branch of a city government usually known as the Common Council, should use the utmost care and caution in the sale or disposition of any one of the franchises above named. A franchise never should be sold to speculators; that is, to parties who desire to purchase for the purpose of reselling to third persons or corporations, and thereby making a profit to the city's disadvantage. Those in authority should never offer a franchise for sale at public auction, or otherwise, without thoroughly investigating as to whether the prospective buyer desires to purchase in good faith, and in the event that the franchise should be turned over to him, that he intends to push its development as a public utility to proper and efficient results. Inasmuch, as when a city has disposed of a franchise it has forever lost practical control over it, and cannot legally negotitate with other parties who would be willing to push the enterprise, it behooves officials to consider well before bartering away this most valuable asset of a city government.

Many a valuable franchise has been frittered away and substantially wasted by its falling into the hands of unworthy would-be promoters and speculators. For an illustration, we need go no farther than the city of Watertown, a beautiful little manufacturing city of about thirty thousand inhabitants, located about ten miles from Lake Ontario, in the northerly section of the State of New York. About twenty years ago, through its city fathers, it disposed of its street railway franchise to speculators, who had no substantial financial backing, and these speculators and their successors, like Rip Van Winkle on the mountain, have slept and dreamed for twenty years, and do what it will, coax, nag, or urge what it may, the city has been unable to awaken them from their slumbers, while the people have suffered for want of street railway facilities.

Officials of a city of the third class, as a rule, are especially anxious to develop its resources and often fail to hestitate and consider that the city is destined to live much longer than those in authority, and, therefore, oftentimes instead of enhancing the welfare and prosperity of the city by the sale or disposition of a franchise, they thereby thwart and blast the fair prospects which a municipality has for future development along certain lines.

Again, when a franchise is disposed of by a municipality, great care should be taken in regard to the matter of legal restrictions. A franchise being a public utility and a kind of commonalty in which all of the people are interested, no undue advantage should be given a private corporation or person over the people generally. Thus, a city should always protect the people against unnecessary negligence and delay in the developing of a franchise granted, and should protect the people against any unnecessary encroachment of their public or private rights.

It is not uncommon that a franchise is disposed of or frittered away after the following method, viz: John Doe for instance, desires or thinks he desires to purchase a franchise for the purpose of speculation—that is, for the purpose of selling it to a third party, and he therefore seeks out his friend Richard Rowe, whom the suffrages of the people have elected alderman. He makes known his desire to this official, and this official becomes interested and in turn interests his brother alderman, and the deal is on, and the result is a sale of, perhaps, a valuable franchise at a nominal sum. Why should these assets be given away or passed around

to friends of councilmen? Why should the city's treasure be recklessly wasted in this manner?

Many years ago, the Watertown Gas Light Company obtained a gratuitous grant of a gas franchise from the city of Watertown. This company has sold gas to the city of Watertown ever since, and the plant has become a very valuable one, and, in fact, so valuable that about three years ago, when this company petitioned the Public Service Commission to increase its capital stock, this franchise was put forth as an item of capitalization at the sum of $100,000. Thus, within the lives of many of those now living, the franchise in question was recklessly and unwittingly disposed of without proper consideration by those in authority, which franchise, in a comparatively few years, was valued by its owner at the large sum above stated. The other franchises of the city no doubt are quite as valuable as the gas franchise under consideration, and were the city in possession of these franchises at the present time, it would thus have at least a half million dollars in assets along these lines. Surely, experience and observation teach us that in the future it would be wise and proper for city officials to insist upon a reasonable consideration being paid the municipality upon the sale or disposition of a franchise, as what is true of Watertown in this regard is largely true of every other city of the third class.

While it is not within the province of this paper to advocate ownership under present conditions of public utilities by state or national governments, yet we do insist that experience and observation have taught us that it is neither wise nor prudent for a municipality to sell or dispose of its franchises, but rather it should retain and develop them. Municipal ownership naturally insures much better service. When public utilities, such as electric light, gas, water, and street railway plants are owned and controlled by private corporations or individuals, the tendency is to give inefficient service and to charge an exorbitant rate even for such service. The question of getting rich quickly is usually involved, and, therefore, the people are usually deprived of the service and comforts from these utilities to which they are entitled. In the matter of the supply of gas and electric lighting, it is not difficult for the owner of the plant or plants to impose upon the people by furnishing inferior product and yet charge an exorbitant price therefor, and if it is a matter of a street railway, it is quite as easy to give inefficient service and yet charge the usual rate. It is true that in the State of New York we have what is known as a Public Service Commission, which protects, to a considerable extent, the rights of the people in matters concerning public utilities, but there is usually no regulation of these utilities, except as the result of a petition being filed, and the public is inclined, as a rule, to be patient and long-suffering. Having had considerable experience along these lines, as attorney for the city of Watertown in several litigations with the owners of its public utilities, we feel certain of our premises.

But, with public ownership of these utilities these obstacles are largely removed, as the question of money-getting is not involved. The natural aim and object of a municipality, for instance, when it owns a public utility, is to give the best service possible at the least possible price, and the taxpayers are required to pay only the actual cost of production, as no dividends are to be paid private corporations or individuals. The city of Watertown, as an illustration, owns and operates the plant furnishing its water supply, and comparison shows that the people of this city are paying a much cheaper rate for water than any other city within the State of New York where there is private ownership.

It is true that it is often impracticable for a city to establish municipal ownership of its public utilities after its franchises have been disposed of and the owners have established large and valuable plants, for in case the city establishes a plant under such conditions, it must purchase and take over the properties of the private corporation or individual, and oftentimes this is in a measure prohibited on account of the enormous and unreasonable price which a municipality is required to pay.

COMMISSIONS FOR CONSTRUCTING SPECIAL PUBLIC WORKS.*

FROM REPORT OF COMMITTEE ON CITY GOVERNMENT AND LEGISLATION.

Horace Andrews, Chairman, Albany, N. Y.

THE report of the committee of the American Society of Municipal Improvements on City Government and Legislation opens with a plea for greater simplicity and less volume in legislation for cities and cites the legislation in New York State in one year as the reason for it. It seems that 522 bills were introduced, 130 of which became laws, affecting forty-two out of the forty-seven cities of the state. But 178 of the bills and twenty-two of the laws referred to New York City, leaving 108 laws affecting forty-one cities, whose population amounts to 1,628,188. Although the cities of the state have been classified, three cities had new charters of 207 to 263 sections each. The character of the laws varies from those of this great importance down to one, for example, providing for the assessment of cost of cleaning snow from sidewalks in a certain city in case the property owner or tenant fails to clean the walk; and and one changing the word "unexpected" in a city charter to "unexpended" balances. The report continues:

It is quite evident that there is a strong tendency to individuality among the cities. If they ever consent to be classed in groups and to have truly uniform laws at some future time, that time has not yet arrived and at present comparison between the governments of the various cities is rendered nearly as difficult as it ever was, despite the so-called uniform charter of cities of the second class.

It is evident that the methods of administering the government of the great city of New York do not meet with unqualified approval. The project of a new charter brings prominently into light the method of organizing the constructive branch of the municipal work, and this is an appropriate theme for the discussion of this society.

The end sought through the discussion is the development of the simplest and most business-like methods in promoting plans for municipal betterment, and after, the adoption of plans; of carrying on the construction in an expeditious manner, and with just as little "redtape" or formality as is possible. At the same time ample and permanent records and strict conformity to legal requirements must be secured. Can the best results be brought about by concentrating responsibility in a Board of Public Work, or with a single commissioner, controlling all the various lines of municipal work, or can better work be done by having all departments under separate heads, reporting and responsible to the Mayor, whose multifarious duties prevent any but a perfunctory oversight of the municipal construction work, thus practically leaving the commissions of water supply, of sewerage, of paving, of public buildings, supreme in their various departments?

The suggestion of this theme for discussion came about through observing developments in the city of New York more particularly, although some of the other large cities seem a little inclined to adopt similar usage. The tendency at this time seems to be toward the employment of special commissions in cases where a difficult situation presents itself as to water supply, sewerage, grade crossing, or other works of magnitude, and this is true not only of New York, but of many other cities throughout the country. Very often it is well to have outside advice upon a difficult municipal problem, as presenting a view of the case which would not, perhaps, suggest itself to a public officer having daily familiarity with the matter under consideration, as well as to secure the agreement of independent designers of the same class of work. This, however, refers more to the examination and reports of a consulting engineer, working in conjunction with the local engineer, than to the "commission" idea, which places in the hands of a board, appointed for that special purpose only, some one great work, which is later to be operated in conjunction with an already existing plant. The general tendency toward orderly proceeding in municipal affairs has led most cities in the

*A paper before the American Society of Municipal Improvements.

past to concentrate constructive work in a committee of citizens, called a "Board of Public Works," or having some other title with similar meaning, and if this board carries on its work in a business-like way there is little need for special commissions.

It seems to this committee that the same care exercised in the selection of a nearly permanent Board of Public Works, as has been shown in the selection of the membership of nearly all of these special commissions, would result in a higher class of construction, more uniform city regulations as to allowable constructions and a greater degree of economy for the city. The present time is generally regarded as an age of concentration of effort, of combinations of small plants operating in similar lines into one large organization where, under one head, all the plants are operated presumably to better advantage as to production and distribution of product, and at a saving of expense resulting from the substitution of one head for many, standardizing of product and other economies.

Much may be said in favor of this close organization where large interests are effected. In private business lines, manufacturing, etc., it seems to be the present day development from a former condition, when competition was said to be the life of trade, to a certain stability of trade conditions resulting from an absence of competition.

The above is observed in general private business, but as to the large municipal business,, there are indications of a rather marked departure from this concentration, as is evidenced by the numerous special commissions, which have, within a comparatively few years, been appointed to undertake works which are more or less special in their nature, but which would seem to fall properly within the scope of the various municipal departments and bureaus already established. The appointment of these special commissions has no doubt been brought about through the necessity of securing continuity of service over longer periods than the usual terms of political officers, in order to carry forward in an orderly and progressive manner some particular great work without the delays incident to frequent changes in the executive head conducting the work, when it might be delayed by such change and thereby inconvenience and annoy the municipality generally. These remarks are intended, not at all as an adverse criticism of the tendency noted, but as simply calling attention to a phase of present development along municipal lines which is of interest to the American Society of Municipal Improvements, and which comes appropriately within our purview, it being our function to "promote the best methods to be employed in the management of municipal departments, and in the construction of municipal works."

At this time we have in New York City, the regularly organized departments in charge of the water supply, gas and electricity, sewerage, street paving, public buildings, docks, parks, etc., and in addition to the above, and acting under special laws, the Board of Aqueduct Commissioners, and the Board of Water Supply acting independendently of the department of water supply and of each other, also, a Metropolitan Sewerage Commission, independent of the sewer department, a Municipal Art Commission, independent of all departments, but passing upon the esthetic features of all public constructions appearing above ground within the city limits, and finally a State Commission, called the "Public Service Commission," having supervision over the carrying corporations and of the companies supplying gas and electric light, heat and power, trenching somewhat on the ground of the department of water supply, gas, and electricity, and falling heir to all of the powers of a former special commission having to do with the design and construction of subways.

While there have been many good reasons for the constituting of these various commissions there seems to be no insuperable reason against the concentration of all the public works of New York City in a single commission or Board of Public Works, analogous to the London County Council. The London County Council has authority over most of the public works of a certain part of London. The division between the "city" and the "county" being somewhat complicated. This body seems originally to have been constituted to have particular authority over all matters relating to drainage and later to have been given supervision over nearly all of the municipal works, except the water works, which are controlled by private companies. Many valuable reports have been issued by this body.

Some of the advantages which might be expected to result from such a concentration of municipal work would be a standardization of the work in similar lines over the entire city and

a greater degree of co-operation among the various branches of the city work. The scientific observations referred to a special commission could just as well be instituted by the single Board of Public Works and the results published with the regular annual city reports. The possibility of enforcing a proper sequence of work in a given locality would mean economy and convenience to the public. The concentration of authority would make impossible any tossing of responsibility from one department to another in cases of accident or dereliction in matters not unequivocally chargeable to one special department. The central authority would designate the branch of the general organization to rectify any defect, and this would make for less neglect of duty where uncertainty as to responsibility might exist under the present methods. Among its special commissions New York City has many very able and public spirited citizens; it is, therefore, to be inferred that in the make-up of such a Board of Public Works as is suggested, the men capable of organizing and conducting such a body would be drawn from that same class of men. For the purpose of securing comprehensive schemes of work and a sustained interest and initiative on the part of the members of such a nearly permanent body, the term of each member should be not less than five years, and the personnel should change slowly, say by the appointment of one new commissioner each year, as the term of one member expired.

It is the hope of this committee that discussion of the general subject will bring out much that may be urged on both sides as to the advantages and the disadvantages of the plan.

Does one large organization induce a lack of initiative through the absence of the rivalry of other departments? On the other hand, does the special commission idea conduce to the planning of unnecessary schemes of work, which may be good in a general way, but more ornamental than useful? With the concentrated organization are the public records apt to be better kept and more accessible for reference? Would the result be in the direction of economy? Would the variety of work in a great city cause a gradual reversion to bureaus pretty much as we know them now? The fact is that the actual work would be done by just about the same people who do it now, and the change would be to one great organization, instead of, as now, many smaller organizations. Would the incentive for each man to do his best work be as great or greater, being part of a great organization, the head of which was nearly constant, or would the best work be done, as we might say, on speculation, where a department head remained for only a limited time and quick advancement might be obtained by special activity?

Would control of all municipal work by one organization, necessarily acting through many bureaus, result in expediting the progress steps in the design and construction of municipal works, or would the practical result be not greatly different from present experience?

A MODERN MUNICIPAL FRANCHISE.*

By Charles Carroll Brown, Consulting Engineer, Indianapolis, Ind.

WHATEVER may be the success of efforts to control public service corporations though state boards or otherwise the fact remains that the best results are obtained when it is made definitely to the interest of the company to give good service. Whatever will aid in producing this result will benefit the community, whether in actual cash received by the city treasury, or in reduced rates to consumers, or in satisfactory service.

The franchise granted to three persons representing commercial organizations in the city of Indianapolis in 1905, which has since been transferred to the Citizens' Gas Company is such a franchise and its terms are worthy of study by companies proposing to start public service industries as well as by cities and companies proposing to make new contracts for service.

The origin of the franchise was in one for a company formed to supply Indianapolis with natural gas late in the '80's, in which Alfred F. Potts was one of the prime movers. Mr. Potts described the company and gave

*A paper before the American Society of Municipal Improvements.

the principal provisions of the franchise in MUNICIPAL ENGINEERING, vol. xiv, p. 182. The controlling feature in this company was the transfer by the stockholder in his subscription for stock of the entire control over his stock, except the receipt of dividends and the right to transfer the ownership, to a named board of trustees, who elected directors, thus precluding the possibility of any competing company or hostile element securing control of the company. There were many other good features in the organization, most of which were transferred, together with the one described, to the franchise of the Citizens' Gas Company. The natural gas company was obliged to go out of business when the supply of natural gas was exhausted, the courts deciding that it had no power under its charter to enter other business, such as the manufacture of gas. After long continued litigation the natural gas company's mains within the city were sold to the new Citizens' Gas Company, organized to manufacture and sell artificial gas at a low price. Some of the provisions in English gas franchises were added to those carried over from the old company, and the result is described here as an indication of what can be done in making a public service corporation really a public servant at the same time that it gives adequate returns to its stockholders.

The company is now constructing a gas plant and is repairing the old mains, and at some time early in 1909 will be ready to furnish gas to its customers, many of whom are already on its lists for connection as soon as the gas is ready to deliver. The company points to the eminent success of the old natural gas company as evidence that its plan is good, and that success is accepted as evidence that the plan described is no experiment, but will demonstrate its satisfaction of all expectations.

The ordinance, approved August 30, 1905, approves a contract made by the Board of Public Works with Alfred F. Potts, Frank D. Stalnaker, and Lorenz Schmidt, and certain fundamental terms of this contract, according to one of its provisions, are included in the state charter of the Citizens' Gas Company, to which the contract with the city was transferred by the three gentlemen named.

The charter broadly gives the company the power to supply Indianapolis and its inhabitants with light, heat and power.

The capital stock of $1,000,000 can be increased at any time by submitting the additional shares to sale at public auction on thirty days' published notice, any premium to go into surplus, and not to bear dividends. It is provided that if extensions of mains are desired, and they cannot be obtained under other paragraphs in the contract, the petitioners for extensions may subscribe for stock sufficient to lay the mains and sign contracts for gas sufficient to pay the interest on the cost, but even then the stock must be put up at auction and must be purchased at par by the petitioners in case it is not sold at a premium at the auction.

These provisions insure that the stock shall always bring its par value into the treasury, and that the dividends paid shall be on this par value, no more and no less. The necessary extensions are also provided for without overburdening the company, while at the same time giving the property owners large interest on the money invested in the extensions and ultimate return of the principal as well.

The capital stock, by the terms of the subscriptions, therefore, under one section of the contract, is placed in the control of a board of five trustees, stockholders, and must be voted as a whole. This Board of Trustees was named in the articles of incorporation, and the Board fills all vacancies, except that one member was nominated by the Mayor of the city, and a vacancy in this particular office is filled by another nomination by the Mayor. Failure of the Board of Trustees to fill a vacancy gives any stockholder the right to petition the Circuit Court to make the oppointment, which it must do if the Board fails to act during ten days.

This provision keeps the company in the control of the Trustees, even if the stock is all bought up by a competing company. The original Board is one in which the people have the fullest confidence. The old gas company stock was largely bought by a hostile interest, but the Board of Trustees retained the control and operated the company for the public's benefit until it was wound up by the courts, although the hostile interest did everything possible to secure the property of the company, and prevent its devotion to the best interests of the public, which was the real owner of the company, all the original investments in stock having been repaid with 8 per cent. interest. The Board of Trustees of the new company is ex-

pected to be equally steadfast in carrying out the original purposes of the founders of the company and the investors in its stock.

Any member of the Board of Trustees can be removed by the Circuit Court on showing that he is an employe or a holder of stock or other securities of any company delivering or purposing to deliver gas in the city, or for corrupt practice or misconduct detrimental to the company's interest.

The Board of nine directors is elected each year by the Board of Trustees, to manage the business and prudential concerns of the company. This relieves the Board of Trustees of all duties, except that of securing competent directors independent of any influence detrimental to the company, and makes it possible to enlist as trustees men of the highest class and possessing the fullest confidence of the citizens and stockholders, without the opportunity to refuse on account of pressure of business or temporary condition of health.

cumulative annual dividends of 10 per cent., payable semi-annually. The earnings of the company are devoted first to the payment of matured debts and operating expenses; second, to the payment of the dividends semi-annually and unpaid accrued dividends; third, to the extensions and betterments ordered by the Board of Public Works; and fourth, to repayments of stock subscriptions, thus reducing the capital upon which 10 per cent. dividends must be paid. When the stockholders have been repaid their entire subscriptions with 10 per cent. interest the stock is cancelled and ownership by the company ceases, and it is wound up.

The old company had the same provisions in its franchise, except that the dividends paid were 8 per cent. and the ownership on repayment of stock subscriptions did not pass to the city. The old company paid back all its stockholders and had property valued at a half million or more when it was wound up. Its franchise provided that in this event gas would be furnished at cost, but almost simultaneously with the complete repayment natural gas gave out, and the company was deemed by the courts unable to manufacture gas. An attempt was made to declare the property of the company, particularly a good system of mains in first class condition, public property, to be transferred to the new company to be formed with power to manufacture as well as distribute gas. The courts decided, however, that the property belonged to the stockholders, notwithstanding their stock had been fully repaid, so the property was sold to the new company at an appraised valuation under the city's option to purchase, and the stockholders receive a large additional dividend after dividends equal to the original investment, plus 8 per cent. interest, at the same time that the new company obtained a distribution system at a fraction of the cost of a new system. The ultimate ownership question is settled in the new company's franchise by transferring the property to the city when the stockholders are fully paid.

The state charter fixes the life of the company at fifty years, and the contract with the city is for twenty-five years. If the stockholders are not all repaid in twenty-five years the Board of Public Works may require the company to bond itself at 6 per cent. for the amounts due the stockholders, pay them off, and then transfer the property to the city, subject to all indebtedness, including these bonds, or may pay the amount due the stockholders itself and thus secure the property. In case the company becomes insolvent the city can acquire the property by paying or assuming the company's debts, including that due to stockholders for still unpaid subscriptions.

The company is required to make semi-annual detailed statements of its affairs, including assets and liabilities, disbursements and receipts, and publish them in two newspapers. The city controller can investigate the books, to check the reports or otherwise, and the city engineer can examine the plant at any time.

The gas furnished must have at least 600 British thermal units per cubic foot, and the price must not exceed sixty cents per 1,000 cubic feet.

There are the usual provisions protecting the city and citizens during construction, giving rights of way, insuring compliance with the terms of the franchise, etc.

There was some discussion of the propriety of inserting one common English provision, whereby an increase in allowable dividend rate would accompany a reduction in price, but this was finally dropped; the English companies continuing in business, while this company may be wound up in twenty-five years.

The principle behind the organization of these companies was the same as that behind many similar organizations; the joining together of public

spirited citizens to supply a needed public service at reasonable cost. The results differ, because in these cases private interest was not permitted to secure control, and the public nature of the service is retained, and the public receives the benefit after the capital invested has received its predetermined just reward. The old company would have continued in business, furnishing natural gas at cost, if the supply had not given out. This plan was, perhaps, better than the new one, of transferring the plant to municipal ownership when the capital invested has been paid off, but the public nature of the business is fully recognized in any event.

The vigorous public campaigns for the sale of stock at $25 a share on monthly payments resulted in many small stockholders ,who become consumers and workers for the company, thus making easier the securing of business by the company.

The certainty of no water in the stock, and the publicity of accounts, as well as the supervisory power of the city officers, insure reasonable fixed charges and minimize the dangers of political manipulation, useless employes, misapplication of funds, so that the low price fixed for gas may be predicted in advance with reasonable certainty, and protected from unfair attack. The public interest in the company makes friends for it. The high character of trustees and directors promises the best of management, based on the highest principles and for the public benefit. The permanence of these boards and the continuance of their high character, as demonstrated by experience, gives this plan a great advantage over municipal ownership.

The original company was formed to enter into business in competition with companies seeking the same opportunity at much higher rates, and was the result of public enthusiasm over a new fuel and the determination to secure it at reasonable rates, so that the consumers, rather than the promoters of the companies, would reap the benefit from the unexpected bounty of nature. The new company was formed to secure the existing mains of the old company and to continue this benefit in the more common field of gas manufacture. But the success of the first company and the successful fight of the new company against all sorts of opposition to its establishment demonstrate the soundness of the principle, and, while some other similar company in the gas field, not being able to secure a distribution system at a low price, may need to start with a higher price for gas at the beginning than the Indianapolis company has established, it can secure the other benefits, and the adoption of the graded scale of increase of dividend rate with decrease in price will give an impetus toward saving in cost, which, judging from English results, will produce even better results than those assumed in Indianapolis. There is no apparent reason why the method should not be applied to other public service industries, and be equally successful.

EDITORIAL COMMENT

The Municipal Society Conventions.

The Septic Tank Patent Litigation.

Effect of Tar, Macadam and Creosote on Trees.

THE MUNICIPAL SOCIETY CONVENTIONS.

As usual at this season MUNICIPAL ENGINEERING devotes much of its space to the papers presented at the fall conventions of the American Society of Municipal Improvements and the League of American Municipalities. We are indebted to the courtesy of several members of the former society for advance copies of their papers, thus enabling our readers to have them with the report of the meeting, as the first forms go to press while the convention is still in session. A report of the convention will be found in the later pages, which are printed nearer the date of publication.

Attention is called particularly to the very practical paper on the construction of brick pavements by Mr. Blair, who is an expert from long study and experience in actual construction. The best is none too good for him and he insists upon it that any departure from the best program is detrimental to the best interests of the city, as well as to those of brick pavements. And he is right.

Another timely paper is that by Prof. Marston before the League of American Municipalities. The portion concerning the septic tank litigation is printed this month. Fuller discussion of this follows under another heading.

There is some indication in the papers presented that the the discussions at the A. S. M. I. convention are not quite as close to the details of practice in construction as possible, but the program contains several names of persons who usually make their contributions in the form of more or less extemporaneous addresses, and the subjects of water supply and sewerage and their purification promise to be well covered. Last year pavements held the front rank, and have their full measure of time this year also, the treatment being of special forms of pavements and special paving materials. These papers will appear that our readers may, as usual, have the most practical features of them all as promptly as possible, and in advance of official or other publication.

The League of American Municipalities held a very successful convention in Omaha, which was up to the usual standard of discussions of the live topics in municipal administration. The league, made up of the legislative and elected administrative officials, very properly leaves the discussion of matters of design construction and operation of public works largely to its sister society, composed of the officers in direct charge of them.

It is difficult to see why there should be any jealousy or any objection to co-operation of these two societies, but efforts to bring them closer together have thus far been of no avail. This may be due to the individual opinions of a very few who are in control, and if so, the difficulty can be overcome. The methods of treatment of subjects in the two societies are so different that an amalgamation of the two would not be advisable, but each set of officials is or should be enough interested in the problems of the other, and especially in their bearings upon his own, to listen with interest to the discussions of them.

If, therefore, the meetings of the two societies were held at the same time, and in the same city, with some little co-operation in the making of the two programs, there would be mutual advantages sufficient to offset the slight inconveniences of the arrangement.

EFFECT OF TAR MACADAM AND CREOSOTE ON TREES.

Some results of an inquiry by the *Surveyor* into the effect of tar macadam on trees in England, instituted on account of a report of damage in France, were given in the October number of MUNICIPAL ENGINEERING. Still more information is contained in numbers of the *Surveyor* received since that date, and in *Good Roads* as to observation and experience in England and the United States. Not one of the reports indicates any deleterious effect of tar on vegetation, even if immediately adjoining the roads. Several engineers make attempts to explain any observations of dead trees by showing the effect of reducing the water supply to the trees by the impervious surface of the new pavement, but none of them admit the possibility of direct damage by the tar as distinguished from damage by any other impervious pavement. In some cases tar walks have been in use for thirty years and tarred roads for ten years or more.

A similar complaint was made in Bristol, England, regarding the effect of creosoted wood blocks upon a nurseryman's stock, and the courts gave judgment for damages to the nurseryman of £40, which was sustained on appeal to higher courts. But Mr. J. W. Bradley, city engineer of Westminster, says in the *Surveyor* that he has made detailed inquiries in all cases where street trees have perished and this action was not confirmed in any case. He has corresponded with American engineers who use a greater proportion of creosote in blocks and their observation agrees with his.

Undoubtedly both these cases are instances of lack of expert investigation of the causes for the observed effects, as was suggested in the editorial in the October number, above referred to, and since engineers have had their attention called to these peculiar results of ill-informed judgments they will doubtless make careful observation of any cases arising in their practice.

THE SEPTIC TANK PATENT LITIGATION.

The article by Prof. Marston on the septic tank patents, found elsewhere in this number of MUNICIPAL ENGINEERING, is in effect an attempt to justify the definition of septic tank made by the court, in which a distinction is drawn between the action in the patented tank and in tanks of similar construction which had been in operation for two years or more previous to the issue of the patents; or, at least, to reconcile it with the existing facts.

The writer is not familiar enough with the details of the presentation of the case to know what tanks were brought up as having been in operation before the patents were issued or applied for, although he has seen practically all the tanks that were so in operation, most of them before there was any question of infringement of patents. It is quite possible that the distinction Prof. Marston makes, following the principle stated by the court, is applicable to these tanks, so that they may not be anticipatory of the patents. The distinction may, in any particular case, become a very fine one. It is probable, however, that one tank, the earliest in date of construction of any in this country, was not before the court, although it is on record in the proceedings of the American Society of Civil Engineers, and has been in operation as a true septic tank under the court's definition part of the last seventeen years. The tank is small and is called on for full operation only during the summer season, but it began operation with a winter population in the village of 800 and serves a summer population of several thousand.

The tank was designed by the writer, primarily as part of a chemical precipitation plant, but when it was constructed he recommended the construction of one of the pairs of tanks and their adaptation to what is now termed septic action, although the term was not then in use, nor was its significance understood. If the tank did not purify the sewage sufficiently the remainder of the plant could be

constructed according to the plans approved by the State Board of Health. But the tank is still in operation, and is classed in the reports of the State Board as a sewage settling tank. The designer thought, from the experience with the chemical precipitation tanks at Round Lake, N. Y., when operated without chemicals, that the simple settling tank would suffice, and it has.

However, it is simply a buried tank with a tight board roof, which excludes more or less successfully light and air, and the sewage under the design was to be introduced and drawn off so as to prevent agitation of the liquid in the tank; also, the design provided baffle boards to prevent direct currents on the surface from inlet to outlet end. The writer stated his opinion, at that time, that the tank would probably not require more than two or three cleanings during the summer season, and none during the remainder of the year. As a matter of fact the sewer commissioner reports that the tank is cleaned once a year.

No chemical examinations have been made, and it is probable that the effluent during the summer will show free oxygen.

The designer cheerfully admits that at that time he knew little about the action of bacteria in the purification of sewage, and nothing of the so-called septic action, but fails to see how the tank differs in any respect from the septic tank defined by the court in the principles of its construction or operation, although it differs in details from the patented septic tank and is not always operated as a true septic tank.

Prof. Marston's distinction is a good one to make, and this tank, as at present operated, belongs to the class of settling tanks not anticipatory of the patents, but, as designed and sometimes operated, the distinction is one for a patent lawyer to make rather than an engineer after practical results.

THE QUESTION DEPARTMENT

Quality of Sand for Concrete.

I am sending you by this mail two samples of sand. Will you kindly tell me by return mail if it is safe to use either of them for a reinforced concrete bridge, either alone or mixed, as they both come out of the same pit right at the work, while we would have to team other sand six miles. We use crushed rock for the aggregate. Kindly advise us at once, as we are at work on the bridge now and would like your opinion before we reach the girders.

W. F. R., Grand Island, Neb.

The samples came to hand in bad order, and but little was left of sample B. They are both clean and largely composed of quartz grains somewhat rounded. Thus far they are satisfactory, but when their fineness is considered, the large proportion of very fine sand is objectionable. The sample A shows 5 per cent. on a 20 sieve, 26 per cent. between 20 and 40, 24 per cent. between 40 and 60, 11 per cent. between 60 and 80, and 34 per cent. passing through an 80 sieve. What little is left of sample B shows practically the same percentages of the middle sizes, with more than twice as much coarse sand and a little more than half as much of the finest sand.

When it is remembered that the standard sand for testing cement is that passing through a 20 sieve and remaining on a 30, it will be seen that less than one-fourth of this sand is of standard size.

The tests of the effect of fineness of sand on strength of mortar are not very concordant, the effect of the combination of sizes in filling voids not being fully taken care of. Some results reported in Sabin's "Cement and Concrete" ($5) indicate that mortar made of sand of about the same proportions as this, i. e., 30 per cent. between 20 and 40 sieves and 70 per cent. passing through a 40 sieve has less strength than mortar made of the standard sand, between 20 and 30 sieves, 20

per cent. less at 28 days and 26 per cent. less at two years' age of briquettes. Mortar was made with 1 part Portland cement and 2 parts sand.

Some French experiments indicate that mortar made of fine sand in proportions of about 1 to 3 has fully 30 per cent. less strength than mortar of like proportions made with coarse sand, and that the proportions must be increased to one of cement and one of sand to produce mortar with fine sand of the same strength as the one to three mortar of coarse sand.

It is evident that this consideration alone will make it economical to haul coarse sand a considerable distance rather than use the amount of cement necessary to produce the same strength of concrete.

It should be remembered, also, that the grains of fine sand require much more cement to surround them wholly and form a matrix for them, and that it is extremely difficult to mix the cement and fine sand thoroughly enough to do this. This is shown by the difference in strength, and also by the tendency of mortar made with fine sand to crumble after it is supposed to have set hard. In making mortar for plastering it is difficult, if not practically impossible, to get mortar rich enough to set hard without making it so rich that it will crack in coming to its final hardness.

Although the samples are very small in quantity, they indicate, therefore, that the sand will not be found satisfactory for concrete girders or arches.

Information About the Use of Concrete Blocks.

I am about to engage in the erection of cement block buildings, and being very desirous of coming in touch with the foremost men in this line, I write with a view to getting a few pointers from you if you find it convenient to grant me any information. G. C., Twin Falls, Idaho.

Concrete block buildings are in themselves not difficult to construct. They are seldom well designed, however, and the use of concrete blocks in houses and buildings of all sorts has been delayed by the unsatisfactory nature of the designs for the buildings and consequent unsatisfactory appearance of the houses, even when the blocks themselves have been unobjectionable.

Some of the cement companies publish pictures and descriptions of concrete buildings, among them many of concrete blocks, and most of these are good examples of the use of blocks. The cement trade papers also publish many pictures of block houses, but most of these are built from designs for frame or brick houses and are far from satisfactory in appearance. The Atlas Portland Cement Co., 30 Broad st., New York City, and the Universal Portland Cement Co., Chicago, Ill., have notable publications of this sort, and further information can be obtained also of many of the cement companies listed under the heading "Cement," in the "Business Directory" printed in each number of MUNICIPAL ENGINEERING.

If the manufacture of cement blocks is to be carried on, the back volumes of MUNICIPAL ENGINEERING, since vol. xxii, contain all the available information upon methods, difficulties and methods of overcoming them, and results. There are several articles by S. B. Newberry, of the Sandusky Portland Cement Co., Sandusky, O., who is probably the foremost expert on the subject, and there are many others covering all the technical, financial and business features of the subject.

More definite information can be given if more definite statement is made of the character of work to be done. The making of blocks is quite a different problem from their use in buildings.

Manufacture of Concrete Blocks—Books on Reinforced Concrete Construction.

Will you kindly tell me what you can about manufacturing concrete blocks, curbing, fence posts, etc.?

What machines are best, and addresses of manufacturers?

How can I obtain a good practical work on putting up of concrete, showing methods of making forms, reinforcing, etc.? G. H. M., Great Falls, Mont.

It would take many pages of this department to contain all the information which has been given regarding concrete block construction in the last ten volumes of MUNICIPAL ENGINEERING. The best way to get all the information of value that has been printed is to read these volumes. There is a little book on "Concrete Block Manufacture," by S. B. Newberry (25 cents), which is an excellent short statement. Rice's "Concrete Block Manufacture" ($2) is also a good book. "Concrete Blocks, the Manufacture of, and Their Uses in Building Construction" ($1.50) is a collection of two prize essays on the subject, and abstracts from a number of other essays entered in the competition.

The manufacture of blocks is not so much dependent on the machine as on the material used and the manner of handling the machine and handling and curing the blocks. In general it may be said that machines which strive principally for speed make really good blocks only when they are run as slowly as the necessities of handling the concrete are properly met. Most blocks are made too dry, and this is an essential to speed. Impervious concrete can only be made by filling the voids in the mass, and a certain amount of time as well as the right proportion of water are essential. Reference may be made to the "Business Directory" printed in each number of MUNICIPAL ENGINEERING for names of makers of concrete block machines and other concrete molds and machines, under the headings "Cement Brick Machinery," "Cement Molds," "Cement Pipes Molding Press," "Cement Posts," "Cement Sewer Pipe," "Cement

Sewer Pipe Machinery," "Cement Tile Machinery," "Combined Curb and Gutter," "Concrete Blocks," "Concrete Construction Machinery," "Concrete Edge Protector."

McCullough's little book, "Reinforced Concrete: A Manual of Practice" ($1.50), is a good elementary book of practical instructions. Other books treating of the theory and giving examples of practice in larger structures are Buel and Hill's "Reinforced Concrete" ($5), Taylor and Thompson's "Concrete, Plain and Reinforced" ($5), Gillette and Hill's "Concrete Construction Methods and Cost" ($5), and a number of other books of less size and value.

Reference may be made to the article elsewhere in this department, entitled "Information About the Use of Concrete Blocks," for some more detail on the first question.

Tests for Wooden Blocks and Vitrified Bricks for Paving.

Do you know of any tests that have been proposed or are under operation for determining the value of wood block pavement? I thought possibly in one of your issues or some book which has come under your notice you have seen such tests advocated and could tell me what they are, or where I could get the information. Also, could you inform me, if in any issue of your paper you had published the standard tests recommended for paving brick? I know the standard for the rattler test, but think there may be some other standards for absorption, cross-breaking, etc., and am writing to ask if you could give me the information.

F. L. P., Hoboken, N. J.

The tests of the value of wood for block pavements have been largely experimental upon pavements laid in streets under various amounts of traffic. Some tests are prescribed for determining the conformity of blocks with the specifications, which are rather tests of the conformity of materials to the standard set for them than of the value of the wooden pavements themselves. There are several articles in MUNICIPAL ENGINEERING on both subjects, such as the following:

"A Chemist's Report on Kreodone Oil for Wooden Block Pavements," vol. xxv, p. 212, gives methods of making tests of creosoted blocks and the creosote oil.

"Tests for Wood Paving Blocks," vol. xxvii, p. 351, gives details of a number of tests of blocks, treated and untreated, and of the oils used in treatment.

"Tests of Other Woods Than Yellow Pine for Pavements," vol. xxxi, p. 384.

"Requirements for Treating Wood Paving Blocks," vol. xxiii, p. 319, giving the tests prescribed.

"Tests of Woods for Street Paving," vol. xxxiv, p. 14, giving the conditions of the practical street test in progress in Minneapolis.

"Improvements in Wood Block Pavements," vol. xxxv, p. 44.

The standard abrasion tests for paving brick adopted by the National Brick Manufacturers' Association, are printed in MUNICIPAL ENGINEERING, vol. xxii, p. 39. These are still the standards. It is there stated that the absorption, cross-breaking, crushing, and specific gravity tests are not comparable in efficiency with the rattling tests, and the efficiency of the absorption test in comparing different wares is denied. Reference may also be made to the following articles for information on the method of making the various test mentioned.

"The Manufacture and Use of Paving Brick," giving the earlier forms of the tests, vol. vi, p. 16.

"Paving Brick, Tests of Qualities," vol. vi, p. 230, contains a similar statement.

"Some Tests of Paving Brick," giving methods of making tests and the results obtained, vol. viii, p. 172.

"Paving Brick Tests and a Proposed Method of Drawing Specifications," giving a full discussion of all the tests and methods of making them, vol. ix, p. 133.

The third article of a series on "Brick Paving From Start to Finish" is devoted to methods of making tests, vol. x, p. 85.

"Testing Paving Brick, vol. xi, p. 300, is a good detailed article on the subject.

"Paving Brick Tests," vol. xi, p. 317, gives the results of comparative tests to show the length of time and the nature of the other conditions which will produce standard results from abrasion and absorption tests.

"Standard Specifications for Paving Brick Tests," vol. xii, p. 154, gives more details of the same and other tests, and includes, also, experiments to determine the best methods of making cross-breaking, hardness and specific gravity tests.

"Supplemental Specifications by the Paving Brick Commission," vol. xii, p. 214, gives the earlier specifications for all the tests adopted by the National Brick Manufacturers' Association in 1897.

"Standard Tests for Paving Brick," vol. xii, p. 210, contains some criticisms of the specifications above named.

"Standard Paving Brick Tests," vol. xv, p. 1, gives a discussion of methods of making abrasion tests.

"Methods of Testing Paving Brick," vol. xvi, p. 250, adds a description of still another method of making the abrasion test.

"A Method of Comparing Rattler Tests of Paving Brick," vol. xviii, p. 223.

"Needed Changes in the Methods of Testing Paving Brick," vol. xviii, p. 235.

"Proposed Standard Method of Conducting the Rattler Test for Paving Brick," by the Illinois Society of Civil Engineers and Surveyors, vol. xx, p. 97.

"Standard Methods of Testing Paving Brick," vol. xxii, p. 39, gives the method finally adopted by the National Brick Manufacturers' Association.

"Comparison of Brick Tests and Street Wear," vol. xxii, pp. 283 and 363.

"The Absorption Test for Paving Brick," vol. xxii, p. 307.

"Experiments on the Value of the Absorption Test for Paving Brick," vol. xxv, p. 156.

"Qualities of Brick," vol. xxviii, p. 217, gives some new methods of making the tests of brick.

"Paving Brick Testing and Inspection," vol. xxx, p. 227, is a good article, collecting together the best practice.

"Tests for Paving Brick," vol. xxx, p. 426, gives some results of tests and comparisons with street wear.

Snow Melting Machines.

I believe you illustrated in some issue within the last two or three years, several snow melting machines which were used experimentally, which, however, were abandoned after the experiments. While I have a file of your recent issues and some of the old ones, I would be obliged if you could send me an extra copy of any number containing a description and illustration of any such snow melting machines.

H. F. C., New York City.

The impossibility of the economical removal of snow from streets by melting it with machines is so easily demonstrated by a consideration of the number of heat units required and the cost of supplying them that MUNICIPAL ENGINEERING has never thought it worth while to devote any space to the descriptions of the machines which have been proposed for the purpose. This statement is made in an answer to a question in vol. xxvi, p. 173, which refers again to vol. vi, p. 53, for an illustrated description of a proposed method of keeping gutters open by means of a steam pipe under the gutter. This device does not attempt to warm up the whole street, but keeps the gutter warm enough to melt snow coming in contact with it and keeps the water moving until it reaches the sewer inlet. While this method can probably not be recommended as economical in comparison with the dumping of snow into a river or into the manholes of large sewers, it may be made efficient in keeping the gutters open, and thus prevent overflows into adjoining cellars.

Effect of Straightening Creek Channel.

If you will pardon me for troubling you I would like to ask you for a solution of the following: The diagram (not produced, but representing a very crooked stream from A to B.—EDITOR.) represents a creek which it is proposed to straighten by means of a ditch (straight line, or nearly so). Distance from A to B, by bends of creek, is nearly forty miles. Fall, forty feet. Length of ditch A to B, ten miles. Average width of creek, top of bank, 70 feet. Depth, bank full, 8 to 12 feet. Slope of bank, say 1 to 1. Depth at low water, 1 to 2 feet, except at pools. Average width of wet valley, one-half mile; swampy except on creek bank.

If ditch is made with equal cross-section to that of creek, how much more water will it carry? How much quicker will it carry off overflow, say 1 foot deep in valley. How if area of cross section is half that of creek?

J. A. W., Lexington, Mo.

It is, of course, impossible to approximate the correct answer to this problem without a personal survey of the conditions and much more information than is given in this letter. In general it may be said that if the new channel has the same fall as the old one and the same area of cross-section, the slope of the channel will be four times as great and the velocity of flow in the channel will be approximately twice as great, since the velocity of flow varies as the square root of the slope. The new channel would therefore carry twice as much water as the old one, approximately. The amount would be diminished by the greater effect of friction on the sides, and the much greater tendency to wash, and it would be increased by the effect of the straightening of the channel, which may be considered equivalent to reducing the friction on its sides. One effect offsets the other more or less completely. Should the new channel be made half the width of the old channel, remaining the same depth, the velocity would be, perhaps, 10 per cent. less than in the wider new channel, and the smaller channel would, therefore, not carry as much as the old channel, unless the effect of the straightening of the channel should offset the narrowing, as might easily be the case. These are merely suggestions and there is no intention to assert that they are more than indications of the direction in which the effects of the changes may be expected to travel, but not of the amount of the changes. There are too many local conditions to consider for one who has not thoroughly studied the ground to venture an opinion on the best dimensions and the proper gradient or slope for the new channel.

Makers of Pressed Brick.

Can you give us list of the pressed brick manufacturers in Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, North and South Dakota. What we want to get hold of is a facing brick. Any information you can give us along this line will be greatly appreciated.

J. H. A., Lincoln, Neb.

Following are the names of a few makers of pressed brick in the states named. There are probably three or four times as many firms engaged in front brick manufacture in these states:

Acme Pressed Brick Co., Alton, Ill.; Belleville Pressed Brick Co., Bellville, Ill.; Bloomington Pressed Brick Co., Bloomington, Ill.; Hydraulic Press Brick Co., 138 Washington st., Chicago, Collinsville and Peoria, Ill.; Western Brick Co., Danville, Ill.; LaSalle Pressed Brick Co., LaSalle, Ill.; McNeil Pressed Brick Co., Newbern, Ill.; Troy Pressed Brick Co., Troy, Ill.; Frost Pressed Brick Co., Des Moines, Iowa; Gladbrook Pressed Brick & Tile Co., Gladbrook, Iowa; Corey Pressed Brick Co., Lehigh, Iowa; Muscatine Pressed Brick Co., Muscatine, Iowa; Oelwein Pressed Brick Co., Oelwein, Iowa;

Tuna Valley Pressed Brick Co., Toledo, Iowa; Platt Pressed and Fire Brick Co., Van Meter, Iowa; Cherryvale Pressed Brick Co., Cherryvale, Kan.; Union Brick Co., Iola, Kan.; Hydraulic Press Brick Co., Kansas City, Kan.; Hydraulic Press Brick Co., 13 N. 3d st., and Wisconsin Red Pressed Brick Co., 214 Lumber Exchange, Minneapolis, Minn.; Cape Girardeau Pressed Brick Co., Cape Girardeau, Mo.; Caruthersville, Pressed Brick & Tile Co., Caruthersville, Mo.; Festus Pressed Brick Co., Festus, Mo.; Kasten & Schmucke Pressed Brick Co., Jackson, Mo.; Hydraulic Press Brick Co., Gumbel Bldg., and Stukenberg Pressed Brick Co., 31st and Wyoming sts., Kansas City, Mo.; Lexington Triumph Press Brick Co., Lexington, Mo.; St. Joseph Pressed Brick Co., 19th and Garfield ave., St. Joseph, Mo.; College Hill Press Brick Works, 1400 College ave., Hydraulic Press Brick Co., Odd Fellows bldg., McNeil Press Brick Co., Victoria bldg., Mission Press Brick & Improvement Co., Marine ave., corner Osage, Progress Press Brick & Machine Co., 3207 Kings Highway, St. Louis Press Brick Co., Cass ave. and Collins st., and Superior Press Brick Co., 3190 Kings Highway, St. Louis, Mo.; Alliance Press Brick Co., Alliance, Neb.; Hastings Pressed Brick Co., Hastings, Neb.; Hydraulic Press Brick Co., Omaha, Neb.; Dickinson Fire & Press Brick Co., Dickinson, N. D.; Sioux Falls Pressed Brick Co., Sioux Falls, S. D.

FROM WORKERS IN THE FIELD

Practical Points from Practical People.

Contributions to this Department are invited. Give from your experience for the benefit of others. No matter about the style of the composition, the fact is what is wanted. Use the Question Department for what you want to know; use this Department for what you can tell others.

Residential Septic Tanks.

Should any of our readers engaged in the building trades happen to read an article on septic tanks for country houses in a recent number of one of their trade papers they will doubtless observe that the instructions there given differ in almost every important particular from those given in the August and October number of MUNICIPAL ENGINEERING. They will also be unable to determine how the water succeeds in standing in the third tank of the series as shown in the drawings. Again, the value of two-inch pipe connections even in a tank for a single residence can not be seen. They will therefore not be disposed to follow these instructions unless they do so without consideration of the troubles which they can readily foresee, especially in the light of the articles in this department above referred to.

Wages of Labor.

An inquirer for prices of labor in various parts of the country is referred to the July Bulletin of the Bureau of Labor, U. S. Department of Commerce and Labor, for a collection of such information. A few figures taken from the report may be of general interest.

An enumeration is made of the workers on streets and sewers in 72 cities under municipal employment, and under private employment by 131 employers in a part of the same cities, and shows 14,800 employes of contractors in 1906 and 14,072 in 1907. The numbers of municipal laborers included in the reports were 25,147 in 1906 and 28,179 in 1907. Probably all the municipal laborers in the cities enumerated are included in the reports, but since only from 2 to 6 employers are located in each city undoubtedly only a part of the employes of contractors are included in the report.

The hours of labor per week decreased in 1907, being for contractors 56.40 in 1906 and 56.05 in 1907, and for municipalities 49 hours in 1906 and 48.74 in 1907. Wages increased, for contractors' laborers from 19.76 cents an hour in 1906 to 20.60 cents in 1907, and for municipal laborers from 22.33 to 23.64. In wages per week the contractors' labor earned most in 1907, $11.55 a week as compared with $11.14 in 1906, and with $11.52 and $10.94 for the municipal laborers in 1907 and 1906 respectively.

The Western (Rocky Mountain and Pacific states) pay the highest wages, 27.67 cents an hour on contract work and 32.13 cents on municipal work. The North

Central (Mississippi Valley) states are next with 22.03 and 23.64 cents respectively; the North Atlantic states next, with 18.23 and 24.42 cents; the South Central states next, with 17.96 and 19.04 cents; and the South Atlantic states lowest with 17.48 and 18.55 cents an hour respectively. If the wages in 1907 of the contractors' laborers working the average number of hours a week are compared there is only one change in order, the Western laborer receiving $14.05 a week, the North Central $12.73, the South Central $10.42, the North Atlantic $10.39 and the South Atlantic $9.45.

A few figures for 1907 from the individual cities will be interesting.

WAGES OF LABORERS ON STREETS AND SEWERS

1907 CONTRACT WORK.

City	Hours a Week.	Wages per Hour Cents.	Wages per Week.
New York, N. Y.	58.47	17.53	$10.25
Chicago, Ill.	53.89	25.42	13.70
Philadelphia, Pa.	60.00	15.47	9.28
St. Louis, Mo.	59.33	22.43	13.31
Boston, Mass.	59.31	20.21	11.99
Baltimore, Md.	50.43	19.09	9.63
Cleveland, O.	60.00	19.01	11.41
Buffalo, N. Y.	51.13	22.84	11.68
San Francisco, Cal.	48.00	31.25	15.00
Pittsburg, Pa.	60.00	17.23	10.34
Cincinnati, O.	58.53	20.23	11.84
Milwaukee, Wis.	60.00	22.84	13.70
Detroit, Mich.	60.00	18.79	11.27
New Orleans, La.	59.04	19.07	11.26
Washington, D. C.	52.37	18.29	9.58
Jersey City, N. J.	59.00	20.63	12.17
Louisville, Ky.	59.52	17.90	10.65
Indianapolis, Ind.	58.00	22.10	12.82
Providence, R. I.	59.44	19.21	11.42
Kansas City, Mo.	58.72	19.77	11.66
Rochester, N. Y.	48.00	21.77	10.45
Denver, Colo.	54.00	26.61	14.37
Toledo, O.	51.51	23.62	12.17
Worcester, Mass.	48.75	21.92	10.68
Los Angeles, Col.	60.00	21.15	12.69
New Haven, Conn.	60.00	16.59	9.95
Syracuse, N. Y.	59.66	19.36	11.50
Memphis, Tenn.	54.81	17.65	9.67
Scranton, Pa.	51.94	17.52	9.10
Portland, Ore.	60.00	25.00	15.00
Atlanta, Ga.	60.00	15.00	9.00
Albany, N. Y.	52.77	19.63	10.36
Grand Rapids, Mich.	60.00	19.05	11.43
Seattle, Wash.	48.00	30.90	14.83
Richmond, Va.	59.22	15.34	9.09
Wilmington, Del.	57.00	15.64	8.90
Trenton, N. J.	60.00	15.00	9.00
Lynn, Mass.	54.00	19.06	10.29
Des Moines, Ia.	54.00	22.76	12.29
Peoria, Ill.	60.00	18.44	11.06
Duluth, Minn.	60.00	23.17	13.90
Salt Lake City, Utah.	48.00	25.54	12.25
Charleston, S. C.	60.00	10.97	6.58
Norfolk, Va.	60.00	14.38	8.63
Tacoma, Wash.	49.83	29.67	14.79
Dallas, Tex.	51.62	20.64	10.65
Wheeling, W. Va.	54.00	19.44	10.50
Terre Haute, Ind.	54.00	19.49	10.52
Dubuque, Ia.	59.55	20.39	12.14
Montgomery, Ala.	60.00	13.12	7.87
Jacksonville, Fla.	60.00	15.46	9.28
Racine, Wis.	59.48	21.13	12.57
Sioux Falls, S. D.	60.00	25.00	15.00

In the table the cities are arranged in order of size. There seems to be but little change in wages with change in size of city, the difference in locality making more difference than the difference in size. If the list is divided into groups of ten each, however, the weekly wages in the first three groups average $11.66, $11.64 and $11.54 while in the next two groups they are $10.62 and $10.78, showing a slight tendency toward lower weekly wages in the smaller cities.

The fourteen cities paying wages of less than $10 a week are all on or very near the Atlantic coast or south of the Ohio river and are the lowest where the cities are both south and near the Atlantic coast. The five cities paying more than $14 a week are all west of the Missouri river.

Effect of Alkali Soils and Water on Concrete.

In a discussion of the subject of irrigation by the American Society of Civil Engineers, Mr. F. H. Newell, the chief engineer of the U. S. Reclamation Service, mentioned the great and increasing use of cement in irrigation works, and also called attention to the fact that some of the smaller concrete structures have failed or crumbled. He says that these failures are presumably due to the strong alkali waters coming in contact with the cement, chemical reactions probably taking place between the sulphates in the natural waters and the constituents of the cement. These reactions are not yet fully understood.

Mr. F. C. Finkle mentions an instance observed about ten years ago at Santa Barbara, Cal., where pipe made of the best qualities of Portland cement, sand and gravel became completely disintegrated, although the workmanship was the same as that on similar pipes which have been in use thirty years and are apparently unaffected. The soil in which the pipe was laid contained iron pyrites, which, by decomposition, produced sulphuretted hydrogen which, presumably, affected the cement. He also mentioned the failure a few years ago of a properly constructed pipe laid in a swamp at Cucamonga, Cal. He thinks it inevitable that carbon dioxide, produced by the decomposition and fermentation of the vegetable matter in the swamp, should form carbonate of lime by combination with the lime in the cement. The cement in the pipe became soft like tile or a mixture of clay and lime dust.

In a recent article in *Brick*, Mr. G. G. Wheat gives some examples of disintegration of cement tile laid to drain a peat bog, which he attributes to an excess of carbonic acid from the decomposition of the vegetable matter. The tile showed a thick incrustation on the lower side where the water had redeposited the resulting carbonate of lime which it had dissolved out of the body of the tile.

The following by Fred W. Brown, in *Mining Science*, is still more nearly to the point:

"Exhaustive tests have shown that more than 2.5 per cent of sulphuric acid in combination as soluble salts in Portland

cement is injurious to some cements. Standard specifications in this country limit manufacturers to 1.75 per cent., while 2.5 per cent. is perfectly safe. Some cements will stand much greater percentages than others. Cements high in their percentage of lime, free magnesia, or free alkali, are the much more readily attacked. A Portland cement of high quality of minimum content in lime, and practically no free magnesia or alkali, will stand the addition of 25 per cent. of sulphate of lime, without failure in water. In Western parlance, the term 'alkali' is a general one used to designate any soluble salt in the soil which makes its appearance on the surface as a gray or white efflorescence on leaching with water. Of these, it is only the sulphates that prove injurious. Our sources of the injurious sulphuric acid are limited to the sulphates of lime, magnesia and soda; the sulphates of iron and alumina are practically negligible as they become decomposed in the portions of the soil that are weathered and occur at depths, and are brought out only by the mineral waters. Of these the sulphate of lime is much the most insoluble, and consequently the least dangerous. When an engineer has charge of construction in a country which gives indication of 'alkali' he should learn the character of his soil, and if it is a shale, or sand, or lime, of Jurassic, Cretaceous or Tertiary formation, he should have small portions of it leached, and the leaching water evaporated to determine if it contains bitter salts. If so, he must guard against the following contingency:

"If a body of concrete, or mortar, is to be interposed between such soil, which may contain water at some time, and the atmosphere, he must make one, or both, of two provisions.

"First—He must provide such drainage for his ground waters that they will have no opportunity to permeate his concrete and evaporate into the air; or,

"Second—He must make his concrete sufficiently dense and impervious that the pores of the same cannot contain sufficient sulphates to decompose the concrete.

"The great trouble in the instance described in the report has been that the concrete, or mortar was porous; the aggregates were not properly selected, sized and proportioned, and so mixed into a soft pulp, and so deposited as to give an impervious layer of mortar on the exterior and interior surfaces of the concrete, or around the brick. When this is properly done and proper cement used, all underground concrete work will be found to withstand permanently the action of these alkalies."

The writer has recently examined a sewage settling basin or septic tank, lined with cement, which has been in operation for sixteen years, and found no indications of any action of the sewage upon the cement mortar.

Specifications for the Manufacture of Reinforced Concrete Pipe.

Concrete—The concrete used in the construction of the pipe shall consist of either of the following mixtures:

(a) One part of Portland cement; two and one-half parts of clean, sharp sand; five parts of crushed stone or clean, coarse gravel not more than 1 inch in diameter.

(b) One part of Portland cement; five parts of sandy gravel, as taken from the pit.

The amount of cement in the mixture may be increased if the engineer shall so order in writing, in which case payment shall be made for the actual cost of the cement added. Crusher run stone, or crushed slag below 1 inch in diameter, may be used with the written consent of the engineer.

Mixing—The concrete shall be mixed in batches enough to make at least one complete section of pipe. When mixed by hand, it shall be done on a tight mixing board, made for that purpose. The sand shall first be spread in a thin layer on the board, and the cement spread over this and the whole turned until of a uniform color. The stone, which shall have been previously wet, shall then be added, together with the required amount of water and the whole turned until all of the particles are coated with cement, and the mixture is of uniform consistency. All mixing machines shall meet the approval of the engineer. If a continuous mixer is used it shall mix the materials to a uniform color before the water is added and shall mix the wet mixture until all the particles are thoroughly coated with cement, and it is uniformly wet. It shall also feed the ingredients in their proper proportions at all times. At least once every twenty minutes the mixer shall be stopped and the platform upon which the concrete is being fed shall be entirely cleared, so that no concrete shall remain thereon long enough to attain its initial set.

Placing—The concrete shall be placed in the forms and thoroughly tamped in layers, not exceeding 3 inches in thickness, as quickly as possible after being mixed. In no case shall concrete be used which has begun to set. The finished pipe shall be kept moist for a period of, at least, six days.

Forms—The forms shall consist of cast iron bottom rings and steel plates rolled to a true circle, for the size for which they are intended. They shall be for rigidly in position so that they cannot be distorted while the concrete is being placed in them.

Cement—All cement used shall be of some well known and reputable brand of Portland cement. It shall be properly stored in a dry, well ventilated place, and properly protected from the weather. There shall not be more than one day's supply of cement out on the work at any

time. Cement that has become lumpy in the packages shall not be used. All cement shall fulfill the requirements of the specifications contained in the professional papers of the corps of engineers, U. S. A. No. 28.

Reinforcement—The reinforcement shall be of steel, in the shape of flat bars and bands. Test specimens shall develop a tensile strength of from 60,000 to 70,000 pounds per square inch, an elastic limit of 50 per cent. of this and an elongation of 22 per cent. The reinforcement shall be of the sizes and shall be placed in the pipe as shown on the attached sheet of details. It shall be held rigidly in position so that it shall be uniform in all sections. The longitudinal bars shall have hooked ends at either extremity for the interlocking of adjacent sections. The circular bands shall have loops punched in them at equal distances apart, through which the longitudinal bars shall pass.

Laying—The sections shall be laid with the spigot ends toward the outlet, and one of the longitudinal rods at the top of the pipe. After the section is laid, a joint shield, made for that purpose, shall be slipped around the pipe with about half its width projecting beyond the end of the pipe. The next section shall then be fitted to the one already laid, care being taken to have the projecting hooks of the longitudinal rods close to the corresponding hooks of the section already in place. A tie-band shall then be slipped through these hooks, locking the sections together. The joint shield shall be drawn up snugly around the pipe and the joint flushed with water. A thin mortar shall be poured in the joint and the shield left in place until the mortar has set. Care shall be taken to completely fill the joints with the mortar. All joints shall be watertight.

ROADS AND STREETS

Benefits of Good Roads — Tennessee Paving Laws — Asphalt Inspection — Washington Street Improvements—Washington Playgrounds

Benefits of Good Roads.

The construction of better roads is urged by W. W. Finley, president of the Southern railway, as a means of advancement in the South. He says:

If the farm is to be profitable it must not merely produce abundant crops, but its products must be put where they can be sold. By whatever means of transportation they may ultimately be carried before they reach the final consumer, our farm products move primarily over the country highway, and the condition of the road leading from the farm to the shipping point, or to a near-by consuming center, such as a manufacturing town, affects materially the profits of the farmer and the value of his farm. The condition of the road controls the size of the load that can be hauled over it and the speed at which it can be carried. An improvement by which the farmer is enabled to carry, with the same vehicle and the same team, a load seventy-five or one hundred per cent. heavier, will result in a substantial saving in his time and in the wear and tear of his vehicles and teams. The construction of good roads leading from a market town has practically the same effect as bringing the farms nearer to the town. It extends by several miles in every direction the area of territory in which farmers can profitably engage in market gardening and dairying. That this is true has been effectively demonstrated in those localities in the southern states and in other sections of the country where road improvements have been carried out intelligently and systematically.

The cost to the farmer of hauling his products over poor roads is not always appreciated, for the reason that it is rare that a farmer pays for having his hauling done. The United States department of agriculture has made an investigation of this matter, however, and the results show the cost for cotton, for instance, to be an average rate of 27 cents per ton per mile for an average haul of 11.8 miles. That road improvement would materially reduce this cost is shown by the following striking statement in the Year Book of the Agricultural Department for 1906:

"If it were possible to increase the average weight of a wagonload of cotton in the United States from three bales, as it now is, to four bales, without increasing the cost of hauling the load, the saving on a crop equal to the one picked in 1905 would amount to $2,000,000; and if the average load of wheat, now 55 bushels, were increased by 20 bushels, the saving effected in hauling a crop like that of 1905 would be more than $8,000,000."

In addition to what may be termed the commercial aspect of good roads they have a highly important social aspect as well. They bring the farmer into closer touch with the world at large. He and his family are not forced to remain at home for days at a time because the condition of the roads may make traveling unpleasant, if not difficult. Good roads insure efficient and prompt rural mail deliveries, placing the newspaper on the table of the farmer early after its publication, enabling him to transact much of his business by mail and to take advantage of early information as to fluctuation in the prices of his farm products. Good roads mean that the farmer and the

members of his family can enjoy to a greater degree the society of their neighbors and friends in the town and country. They mean that his children can be more regular in school attendance and can receive, to a greater degree, the advantages of education. They mean the bringing closer together of the town and country, with advantages on both sides, for as the farmer is benefited by being brought into closer touch with the town, so all the business interests of the town prosper as the result of the facility with which the farmer and his family can do their shopping. Good roads also benefit the inhabitants of towns and cities by affording facilities for pleasant country drives. They invite the business man to the establishment of country and suburban homes, such as he can enjoy only when he is assured that the condition of the roads will be such as to enable him to reach his place of business promptly in all kinds of weather.

I think it may truthfully be said that there are few matters of such general importance to all the people of any community as the provision of good roads, and I believe, therefore, that all of us who have the progress and prosperity of the south at heart should do all in our power to aid in the creation of a public opinion favorable to road improvement. The system that should be adopted in any locality is one on which it would not be proper for me to tender advice, even if I were qualified to do so. It is necessarily a matter that can best be determined by the people directly interested, and who are acquainted with the peculiar needs and conditions in their neighborhoods. The interest of this company in good roads, as a means of aiding in southern development, was evidenced in a very practical way when, a few years ago, in co-operation with the National Good Roads Association and the Department of Agriculture, it sent a special good roads train over the system, carrying road-building machinery and expert road-builders, who built short stretches of object-lesson roads and delivered addresses at central points where good roads conventions were held. The Land and Industrial department of this company is keeping in close touch with the good roads movement throughout the territory traversed by its lines, and will be glad, at all times, to co-operate with the people of any locality by giving information, or in any other practicable and reasonable way.

New Street Paving Laws in Tennessee Beneficial.

The city of Knoxville, Tenn., has 12.53 miles of paved streets, as follows:

Asphalt	28,689 ft.
Vitrified brick	21,650 ft.
Bitulithic	12,370 ft.
Granitoid	8,741 ft.
Total	71,450 ft.

The citizens of Knoxville are indebted, according to local press reports, to H. M. Branson and his associates, who framed the so-called "abutting property law," providing a plan for paving streets in the city. Except for this law, a bond issue would have been required to secure more paved streets, as it is impossible to put down the paving out of current revenues with the low valuation of the property in the city, and a municipal tax rate of only $1.25 per $100.

The several cities in the state of Tennessee endeavored, for years, to secure an abutting property law that was constitutional. The efforts failed until Knoxville presented its bill in 1905, which was passed by the legislature of that year, and became a law. One district was paved immediately and the law was tested in the Supreme Court and declared to be constitutional. Other cities in the state then secured laws similar to Knoxville's statute, and street paving in that state was given an impetus.

Inspection of Asphalt and Cement in Washington.

The annual report of Julian O. Hargrove, inspector of asphalts and cements for the District of Columbia, has been submitted, showing the transactions of the department during the year ending June 30, 1908, and estimates for the next fiscal year. During last year the department made tests as follows: 100,000 barrels of cement before being purchased for use in street work; 1,200 samples of asphalt; 29 samples of oil. More than 400 miscellaneous examinations and analyses were made; more than 99,000 barrels of Portland cement were tested, and more than 3,000 barrels were rejected during the year.

Inspector Hargrove recommends that he be given an appropriation of $9,060 with which to operate his office during the year commencing July, 1908. This is $485 more than was appropriated for the present fiscal year.

Street Improvements in the District of Columbia.

The elimination of such grade crossings of steam railroad tracks as still exist outside the city limits by progressively securing appropriations for the purpose is recommended by C. B. Hunt, engineer of highways, in his report submitted to the commissioners of the District of Columbia, October 15.

He also recommends that the appropriations yearly made for the construction of county roads be aggregated into a single appropriation, to be expended on the roads named in the bill in a manner analogous to the operation of the schedule for paving streets within the city. This change has been recommended by Mr. Hunt for several years, and he claims that it is more important today than it ever was.

Another recommendation made by Mr. Hunt, which is regarded as important, is that collections of special assessments for improvements under assessment and permit work be credited in equal parts to the United States and the District of Columbia, instead of to the current appropriations, and that appropriations, as made by Congress, be increased by the total of these collections, as shown by past experience. The amount to be expended

will thus be known in advance, not only by Congress, but by the office charged with the execution of this work under the appropriation.

During the fiscal year ended June 30, 1908, Mr. Hunt says of the work done under his supervision, the following:

The total amount of funds appropriated by Congress and deposited by corporations and others for disbursement by the surface division during the fiscal year ended June 30, 1908, aggregated about $1,285,000, of which about $200,000 was for paving sidewalks and alleys in all parts of the District of Columbia; $485,000 was for paving new streets and for repairing and repaving old ones within the city limits; about $218,000 was for construction and repair of suburban streets and county roads; $15,000 for grading streets and alleys, and $4,000 for a survey and plan of treatment of Rock Creek valley; about $65,000 for the maintenance and construction of all bridges in the District; about $175,000 in connection with the elimination of grade crossings, while approximately $150,000 was spent in repairing pavements disturbed by excavations on account of other branches of the District government and by various corporations and plumbers.

A BITUMINOUS MACADAM ROAD, GRAND RAPIDS, MICH.

Washington Playgrounds.

The Washington Playgrounds Association has suggested the institution of night playgrounds, for boys and girls who must work during the daylight hours, as a new feature of the playground system of the District of Columbia. The handicaps of the last summer, on account of a lack of adequate appropriations from Congress, are also set forth by the association. It urges the need of liberal provisions by the Senate and House next winter for the purchase of playground sites, the establishment of field-houses at the Rosedale playground, and bathing beach and other improvements, which will make the present playgrounds permanent features of the District.

WATER AND SEWERS

Battery Arrangement of Water Meters—Diversion of Water from New Jersey—Irrigation in Colorado—Grand Rapids Water Plants—Baltimore Sewerage—Chicago Sewage Purification

Battery Arrangement of Water Meters.

George E. Booker, of San Francisco, solves the problem of metering large consumers of water, as follows:

In the use of large meters it sometimes happened that the meter got out of order and failed to register, and we found in such cases that it was next to impossible to make an average bill which was acceptable to the consumer—it also happened that the meter always got out of order at a time when the consumer was unprepared to have the water shut off, even for the limited time necessary to change it, therefore we devised the plan of using a "battery of meters" in place of one large meter.

Formerly we had installed a by-pass with a sealed gate with the view to using the by-pass during the time when the work of changing the meter was in progress—but this system proved anything but satisfactory, as we found the gate on the by-pass open on several occasions, always of course without the knowledge of the consumer.

Then we found another difficulty in bringing about a satisfactory settlement, which was that the consumer invariably put in a claim that he had used less water during the time the meter failed to register than at any time during his business career—and although he was honest enough not to accuse the meter of purposely breaking down during his dull time, he was not always so sure that the officials of the company had not put up a job on him.

Since we have used the battery we have not had to contend with the objections of consumers about the shutting off of water, as we have been able to make the necessary changes without discontinuing the supply for a moment—which of itself is of sufficient importance to prove the advantages of the battery. Besides we find that it is much easier to handle the smaller sized meters.

The largest meter we now make use of (except in cases where the old 3, 4 and 6 inch meters are still in running order) is the 2 inch meter—and these we use in multiple acording to the requirements of the service.

We furnish the meters and keep them in repair in all cases except where the pipe is to be used for fire protection, and in the latter case we charge for the cost of the connection and also for the meters, and we use the battery on fire-pipes as well as on all other large connections. Experience has proved to us that the battery is a most excellent innovation and one that cannot help but give satisfaction wherever tried.

Cannot Divert Water From New Jersey Into Other States.

The United States Supreme Court has handed down a decision upholding the constitutionality of the New Jersey statute of 1905, prohibiting the diversion of water from New Jersey into other states. The Bacheller anti-water diversion act became a law May 11, 1905, and provides that it shall be unlawful for any person or corporation to transport the waters of any fresh water lake, pond, brook or stream into any other state. The court ruled that the state's right in the waters of the stream within its borders is supreme, paramount even to the rights of riparian owners or others to whom grants may have been given. The decision is as follows:

"This is an information, alleging that the defendant, the plaintiff in error, under a contract with the city of Bayonne in New Jersey, has laid mains in that city for the purpose of carrying water to Staten Island in the state of New York. By other contracts it is to get the water from the Passaic river, at Little Falls, where the East Jersey Water Company has a large plant by which the water is withdrawn. On May 11, 1905, the State of New Jersey, reciting the need of preserving the fresh water of the state for the health and pros-

perity of the citizens, enacted that "It shall be unlawful for any person or corporation to trasport or carry, through pipes, conduits, ditches or canals, the waters of any fresh water lake, pond, brook, creek, river or stream of this state into any other state, for use therein." By a second section a proceeding like the present was authorized, in order to enforce the act. Laws of 1905, c. 238, p. 461.

After the passage of this statute the defendant made a contract with the city of New York to furnish a supply of water adequate for the borough of Richmond, and of not less than three million gallons a day. Thereupon this information was brought, praying that, pursuant to the above act and otherwise, the defendant might be enjoined from carrying the waters of the Passaic river out of the state. There are allegations as to the amount of water and the probable future demand upon which the parties are not wholly agreed, but the essential facts are not denied. The defendant sets up that the statute, if applicable to it, is contrary to the Constitution of the United States, that it impairs the obligation of contracts, takes property without due process of law, interferes with commerce between New Jersey and New York, denies the privileges of citizens of New Jersey to citizens of other states, and denies to them the equal protection of the laws. An injunction was issued by the chancellor, the decree was affirmed by the Court of Errors and Appeals, and the case then was brought here.

RIPARIAN OWNER'S RIGHTS.

The courts below assumed or decided and we shall assume that the defendant represents the rights of a riparian proprietor, and on the other hand that it represents no special chartered powers that give it greater rights than those. On these assumptions the Court of Errors and Appeals pointed out that a riparian proprietor has no right to divert waters for more than a reasonable distance from the body of the stream or for other than the well-known ordinary uses, and that for any other purpose anywhere he is narrowly limited in amount. It went on to infer that his only right in the body of the stream is to have the flow continue, and that there is a residuum of public ownership in the state. It reinforced the state's rights by the state's title to the bed of the stream when flowed by the tide, and concluded from the foregoing and other considerations that, as against the rights of riparian owners merely as such, the state was warranted in prohibiting the acquisition of the title to water on a larger scale.

We will not say that the considerations that we have stated do not warrant the conclusion reached; and we shall not attempt to revise the opinion of the local court upon the local law, if, for the purpose of decision, we accept the argument of the plaintiff in error that it is open to revision when constitutional rights are set up. Neither shall we consider whether such a statute as the one before us might not be upheld, even if the lower riparian proprietors collectively were the absolute owners of the stream, on the ground that it authorized a suit by the state in their interest where it does not appear that they all have released their rights. But we prefer to put the authority which can not be denied to the state upon a broader ground than that which was emphasized below, since in our opinion it is independent of the more or less attenuated residuum of title that the state may be said to possess.

RIGHTS OF THE STATE.

All rights tend to declare themselves absolute to their logical extreme. Yet all, in fact, are limited by the neighborhood of principles of policy which are other than those on which the particular right is founded, and which becomes strong enough to hold their own when a certain point is reached. The limits set to property by other public interests present themselves as a branch of what is called the police power of the state. The boundary at which the conflicting interests balance cannot be determined by any general formula in advance, but points in the line, or helping to establish it, are fixed by decisions that this or that concrete case falls on the nearer or farther side. For instance, the police power may limit the height of buildings, in a city, without compensation. To that extent it cuts down what otherwise would be the rights of property. But if it should attempt to limit the height, so far as to make an ordinary building lot wholly useless, the rights of property would prevail over the other public interest, and the police power would fail. To set such a limit would need compensation and the power of eminent domain.

It sometimes is difficult to fix boundary stones between the private right of property and the police power when, as in the case at bar, we know of few decisions that are very much in point. But it is recognized that the state as quasi-sovereign and representative of the interests of the public has a standing in court to protect the atmosphere, the water and the forests within its territory, irrespective of the assent or dissent of the private owners of the land most immediately concerned. What it may protect by suit in this court from interference in the name of property outside of the state's jurisdiction, one would think that it could protect by statute from interference in the same name within. On this principle of public interest and the police power, and not merely as the inheritor of a royal prerogative, the state may make laws for the preservation of game, which seems a stronger case.

The problems of irrigation have no place here. Leaving them on one side, it appears to us that few public interests are more obvious, indisputable and independent of particular theory than the interest of the public of a state to maintain the rivers that are wholly within it substantially undiminished, except by such drafts upon them as the guardian of the public welfare may permit for the purpose of turning them to a more perfect use. This public interest is omnipresent wherever there is a state, and grows more pressing as population grows. It is fundamental, and we are of opinion that the private property of riparian proprietors cannot be supposed to have deeper roots. Whether it be said that such an interest justifies the cutting down by statute without compensation, in the exercise of the police power, of what otherwise would be private rights of property, or that apart from statute those rights do not go to the height of what the defendant seeks to do, the result is the same. But we agree with the New Jersey courts, and think it quite beyond any rational view of riparian rights, that an agreement of no matter what private owners could sanction the diversion of an important stream outside the boundaries of the state in which it flows. The private right to appropriate is subject not only to the rights of lower owners, but to the initial limitation that it may not substantially diminish one of the great foundations of public welfare and health.

We are of opinion, further, that the constitutional power of the state to insist that its natural advantages shall remain unimpaired by its citizens is not dependent upon any nice estimate of the extent of present use or speculation as to future needs. The legal conception of the necessary is apt to be confined to somewhat rudimentary wants, and there are benefits from a great river that might escape a lawyer's view. But the state is not required to submit even to an esthetic analysis. Any analysis may be inadequate. It finds itself in possession of what all admit to be a great public good, and what it has it may keep and give no one a reason for its will.

The defense under the Fourteenth Amendent is disposed of by what we have said. That under Article 1, Section 10, needs but a few words more. One whose rights, such as they are, are subject to state restriction, cannot remove them from the power of the state by making a contract about them. The contract will carry with it the infirmity of the subject matter. But the contract, the execution of which is sought to be prevented here, was illegal when it was made.

The other defenses also may receive short answers. A man cannot acquire a right to property by his desire to use it in commerce among the states. Neither can he enlarge his otherwise limited and qualified right to the same end. The case is covered in this respect by Geer vs. Connecticut, 161, U. S. 519, and the same decision disposes of the argument that the New Jersey law denies equal privileges to the citizens of New York. It constantly is necessary to reconcile and to adjust different constitutional principles, each of which would be entitled to possession of the disputed ground but for the presence of the others, as we already have said that it is necessary to reconcile and to adjust different principles of the common law.

The right to receive water from a river through pipes is subject to territorial limits by nature, and those limits may be fixed by the state within which the river flows, even if they are made to coincide with the state line. Within the boundary citizens of New York are as free to purchase as citizens of New Jersey. But this question does not concern the defendant, which is a New Jersey corporation.

Irrigation from Timpas Creek, Colorado.

Work on the reservoirs and ditches of the Timpas Creek Reservoir Ditch and Land Company was begun on an extensive scale the latter part of September, at Timpas, a station on the Santa Fe railroad, eighteen miles south of La Junta, Colo.

The lands to be irrigated are the finest in the state of Colorado, comprising ten thousand acres. The irrigation of the lands will open up an entirely new section of the Arkansas valley. The water supply will be secured from Timpas creek, and will be conveyed to two reservoirs. The excavations for ditches and the building of the reservoir dams will necessitate the handling of 700,000 cubic feet of earth. The dam across Timpas creek has been constructed and is of reinforced concrete, as is also the headgate.

The directors of the Timpas Creek Reservoir Ditch and Land Company are H. L. Brannon and J. Van Horn, of Rocky Ford, Colo.; C. S. Essex and J. A. Barclay, of Pueblo; H. F. Krueger, of Denver.

Private and Public Water Plants in Contest at Grand Rapids, Mich.

The United States Supreme Court, Grand Rapids, Mich., issued a temporary restraining order, October 19, to prevent any interference on the part of the city of Grand Rapids, Mich., with the business of the Grand Rapids Hydraulic Company, pending the final hearing of the writ of error in the extended controversy over the right of the private water corporation to exist as a rival of the municipal water-works department. A hearing upon the petition for injunction has been set for November 9, when the court will decide whether or not it shall hold good until the final settlement of the controversy.

Baltimore's Proposed Sewerage System.

The annual report of the sewerage commission, Baltimore, Md., contains an official statement from chief engineer Kendrick, saying that the sanitary sewers now under construction will cost $14,000,000. His estimate is based "upon present prices and the assumption that it will be possible to push the work vigorously." He says that if, for any reason, the work should be delayed, an increased allowance would have to be made for salaries, office rent, and other expenses. He believes that if the work is vigorously prosecuted the sanitary sewers can be fully completed by the year 1914. The report shows that an additional loan of at least $4,000,000 will be necessary to complete the sanitary sewers, but this additional loan will not be needed for three or four years. It was believed, at first, that the cost of the work would be $10,000,000. The entire storm water system can probably be constructed for about $4,500,000. In connection with this work Chief Engineer Kendrick says:

It must, however, be clearly borne in mind that it is not intended to spend all of this amount out of the sewerage loan, as the commission adopted the policy last year of spending only $100,000 a year for storm water drains. If this policy is followed, approximately $600,000 will be spent for storm water drains, beyond what has already been expended, making a total of about $1,100,000 up to the year 1914, at which time the sanitary system will be about completed. When this $1,100,000 has been expended, the storm water drainage system of the city will be in much better condition than at present. The construction of additional drains can then be continued along the lines of the general plan as the demands of the city's growth require.

Purification of Chicago Sewage Recommended.

It is claimed that since 1904 the water supply of Chicago has shown increased

pollution, and that all sewage should be partly purified before being sent to the Chicago river, or the drainage canal, as a means of safety to public health. The city health department, the sanitary district, and the federal engineers have been working together for six months to find a remedy. Dr. J. F. Biehn, city bacteriologist, asserts that the water supply "is becoming progressively worse," and that it has almost reached the stage of pollution existing before the drainage canal was constructed.

Health Commissioner Evans does not agree that the conditions are so serious, but says that the analyses of the drinking water have been watched with much anxiety during the last year, with the result that more colon bacilli have been found than heretofore. He predicted serious conditions within a few years, unless some method of taking care of the sewage of the Calumet district is found.

Colonel W. H. Bixby, of the United States corps of engineers, urges partial purification of all sewage emptied into the river or the canal. He is of the opinion that the sanitary canal has about reached the limit of its usefulness, unless purification of sewage is adopted.

MUNICIPAL AND TECHNICAL LITERATURE

Garbage and Refuse Destructors.

The English system of destruction of garbage in furnaces at high temperatures is gradually making its way in this country. Municipal officials will find a booklet by M. N. Baker, entitled "Notes on British Refuse Destruction," published two or three years ago, a valuable source of information about the successful and partially successful plants in England and Scotland. One notable fact is the location of many plants in thickly populated districts, where they are handled in such way as to produce little or no complaint.

New Publications.

The Purification of Sewage. A brief account of the scientific principles of sewage purification and their practical application. Second edition, revised and enlarged, with an appendix on the analysis of sewage and sewage effluents. By S. Barwise. 220 pp., cloth, $3.50 net. D. Van Nostrand Co., New York City.

The first edition of this book was published in 1898 and was reviewed in MUNICIPAL ENGINEERING several years ago. There have been great advances in the science of sewage purification in the past ten years and many of these are shown in the material added in this second edition, which is nearly twice as large as the first edition without counting the 25 pages in the appendix. This makes the book the best general view of the present state of the art of sewage purification which has been published and it will also serve very well as a guide to the engineer who is investigating the subject.

The book gives English practice only, but most of the experimentation has been done in England and the experiments in this country are leading to the adoption of the same general methods used in England. The book is therefore quite as valuable for American as for English engineers and municipal authorities for, while conditions are somewhat different in this country from those in England, the resulting differences in practice are in details rather than in principle and the book is devoted to the latter, giving only incidental attention to the former. There are but few American series of experiments or sucessful installations to which to refer and these are so recent that they have thus far been reported only in part and only in the technical press. Examples of the successful systems having been described in many numbers of MUNICIPAL ENGINEERING and others will be described in future numbers, thus supplementing the book and bringing the knowledge of our readers down to date.

The earlier chapters on the nature and composition, the chemistry and the varieties of sekage and the changes it undergoes, river pollution and its effects, the land treatment of sewage, precipitation, precipitants and tanks have been improved by some additions. The later chapters have been rearranged and much new material has been added. These chapters now treat the liquefaction of sewage, the principles involved in the oxidation of sew-

age, artificial processes of purification, automatic distributers and special filters. The various forms of septic tanks are described, also contact beds, percolating and continuous filters, and many of the kinds of apparatus used in operating them.

The appendix describes the apparatus required for sewage analysis, the standard solutions used and the methods followed by the author, with useful tables for making deductions.

The book is quite fully illustrated with drawings and photographs and the larger type and page improve its appearance.

Municipal Reports.

Twentieth Annual Report of the Water Commissioner of Dover, N. H. 1907. Henry E. Perry, Superintendent.

The standard summary of statistics is used. This shows the population supplied to be 13,500, using 56 gallons per day for each consumer, or 50 per inhabitant of the city. The cost of pumping water was $21.78 per million gallons ($12.10 per million 100 feet head), and the total cost of supplying water was $45.13 per million gallons, but if receipts for repairing service pipes and meters and relaying pipe and sales of grass are deducted from the maintenance and operation account, the net cost for supplying water is $36.62 per million gallons. Interest on bonds increases the cost $47.10 per million gallons. Meters have been installed on 43 per cent. of the services and 46 per cent. of the receipts are from metered water. A strong plea for more meters is made and the proximity of the plant to the limit of its present supply is good backing for it. About 70 per cent. of the water is pumped by an electric driven triplex pump and 30 per cent. by a steam pump. The electric pump was installed April 1, 1907, and its test showed 74.8 per cent. efficiency, the guaranty being 70.

A portion of the supply which contains much iron has been made satisfactory by a method of aerating and filtering through sand.

Receipts were about $6,700 more than expenditures for maintenance, operation and improvements, and $6,000 was applied on the bonded debt of $292,000. The net cost of the works to date is $355,000. The city pays $4,000 for all public uses. There are 185 hydrants. If these were all public hydrants the rate would be about $22 a hydrant, probably not half the city's proper share of the cost of operating the plant.

ORGANIZATIONS AND INDIVIDUALS

American Society of Municipal Improvements—New England Waterworks Association—Good Roads Convention—Technical Meetings—Civil Service Examinations—Personal Notes

The Convention of the American Society of Municipal Improvements.

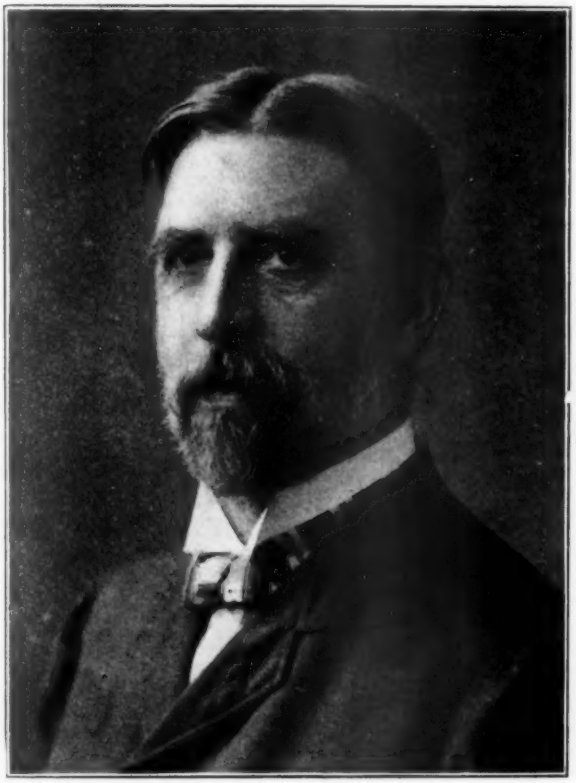
The first notable feature in the convention of the American Society of Municipal Improvements, held in Atlantic City, October 20, 21, and 22, was the fact that the members were present at the first session, comparatively few arriving after the first day. This was in marked contrast to the Detroit convention, which was able to make no more than a pretense of beginning until the second day and did not develop its full convention fervor until the last sessions. This feature was most favorably commented on and showed clearly the advantages to convention and to individuals of prompt arrival. The next notable feature was the president's address, which was one of the best the society has heard.

There was but one distraction, the trip on Wednesday afternoon, so that the business of the convention was carried through on schedule time and there was nothing left for the overflow sessions of Thursday afternoon and Friday morning, so the convention, much to the surprise of the exhibitors and of some members, adjourned at noon on Thursday.

The exhibitors could hardly complain, however, at least those engaged in the paving business, because, for the first time in the history of the society, most of the two sessions of Wednesday night and Thursday morning were given up to the promoters of the numerous new paving and road improving materials and methods, where they had full opportunity to present their views of the points of advantage of their wares as compared

with others. Heretofore papers, written upon special forms of apparatus, methods, or materials, have been presented with regard to their scientific features and the advertising features were reduced to the minimum. This year the conditions were, to a certain extent, reversed, although the papers presented their subjects, to a degree, from the scientific as well as the business standpoints. There was some slight question among the members regarding the propriety of this proceeding, but the only very definite expression was to the effect that the papers of this sort should be placed at the end of the regular program, so that they would not interfere with the regular business of the convention. Thus, in order to close at noon on Thursday, the discussion of the excellent report of the committee on city government and legislation, most of which will be found elsewhere in this number of MUNICIPAL ENGINEERING, was cut short, and several papers were read by title because of the absence of the authors, or their desire, in common with many of those in attendance, to leave on early afternoon trains.

As suggested in an editorial, written before the convention, the number of practical papers on subjects directly connected with the work of the members was smaller than usual, and the total number of papers listed on the printed program was less. This was partly made up by the addition of several new papers, most of which were, however, from the officers or agents of pavement companies who had not responded to the secretary's invitation in time to appear on the printed list. Possibly these could be classed as practical papers, although based largely on ideal conditions not always attainable. One or two of the exhibitors of paving materials did not enter the talking race, and the paper on brick paving was so excellent that a vote of thanks was given the organization responsible for the presence of its author. It will be found, almost in full, elsewhere in this number of MUNICIPAL ENGINEERING.



JAMES OWEN, MONTCLAIR, N. J.
President A. S. M. I.

The complaints heard at the con-

vention were very few. The general and strongest feeling was one of satisfaction with the businesslike way in which the convention proceedings were carried on, and the excellence in their respective lines of the papers and lectures provided. One

JULIAN KENDRICK, BIRMINGHAM, ALA.
First Vice-President A. S. M. I.

very commendable feature was the material increase in membership. Last year the society voted $500 for the use of the bureau of information and a campaign for membership, but less than $400 was actually expended. While the new members cost something like $3 each, measured in terms of the cost of the campaign, and those actually gained from the campaign cost more than this per capita, the money was well expended and the effort should be continued. The new members, as will be seen from the list appended, are from all parts of the country. The effect upon attendance was not strongly marked, the registry showing little, if any, increase in number of members present aside from associate members and their associates. For several years there has been complaint that the early part of October was too full of the closing up proceedings of the season's work to make attendance at the convention easy. This year the convention was later and there was a slight improvement in attendance. Next year the meeting will probably be held in November and the usual objection will lose its force. Municipalities reap the benefit of the attendance of their officials at these meetings and should pay their expenses, but there are many, especially the smaller cities, which have not recognized this fact.

The greatest good to the greatest number of members will result from the holding of the convention as near the center of its prospective membership as possible. This is reasonably near the center of population, as computed by the census bureau, which is reasonably near to Indianapolis. Actually the east contains more municipal officials interested in improvements than the far west, and again, the new southern members keep up their membership better than do new members from the north. These considerations move the center, say to Cincinnati. But the society exists also to spread its benefits abroad and must sometimes do this by going to a district starting on the line of improvement. This consideration and the enthusiastic invitations to inspect the wonders of the southwest no doubt influenced the decision of the society to go to Little Rock next year.

Some of the papers presented at the convention will be found in this number of MUNICIPAL ENGINEERING. Many others will appear in subsequent numbers, far in advance of their publication in the proceedings of the society. Following is the program as presented:

Tuesday afternoon, October 20: Address of welcome by Mayor Franklin P. Stoy; response by the president; address by the president; report of officers; report of the committee on municipal data and statistics, J. W. Howard, chairman, New York City; "Municipal Accounts in the Abstract," by A. M. Heston, city comptroller, Atlantic City, N. J.

Tuesday evening: "The Joint Construction and Operation of Sewerage Works; The Drainage District as Distinct from the Municipality," by E. S. Rankin, engineer in charge of sewers, Newark, N. J.; "Tight Joints in Pipe Sewers," by Benj. E. Briggs, city engineer, Erie, Pa.; "The Construction of a Reinforced Concrete Intercepting Sewer," by Alexander J. Taylor, engineer in charge of sewers, Wilmington, Del.; "The Campaign Against Mosquitos in New Jersey," by Prof. Smith, New Brunswick, N. J.

Wednesday morning: Report of the committee on waterworks and water supply, J. L. Ludlow, chairman, and "Some Notes on the Current Growth and Extensions of Public Water Supplies, by J. L. Ludlow, consulting engineer, Winston-Salem, N. C.; "Importance of the Proper Operation of Water Purification Plants," by Geo. W. Fuller, consulting engineer, New York City; report of committee on review, C. D. Pollock, chairman, Brooklyn, N. Y.; "Sewage Purification vs. Water Purification," by Geo. C. Whipple, consulting engineer, New York City.

Wednesday evening: "The Essex County Park System," by Engineer A. M. Reynolds, Newark, N. J.; "Practical Result of the Municipal Control of Shade Trees," by Wm. Solotaroff, secretary and superintendent, shade tree commission, East Orange, N. J.; "Pavement Material Tests from a Municipal Standpoint," by J. W. Howard, New York City; "Imperial Roads, Their Aims and Accomplishments," by W. B. Spencer, vice president Imperial Roads Co., New York City; "The Proper Construction of Brick Street Pavements," by Will P. Blair, correspond-

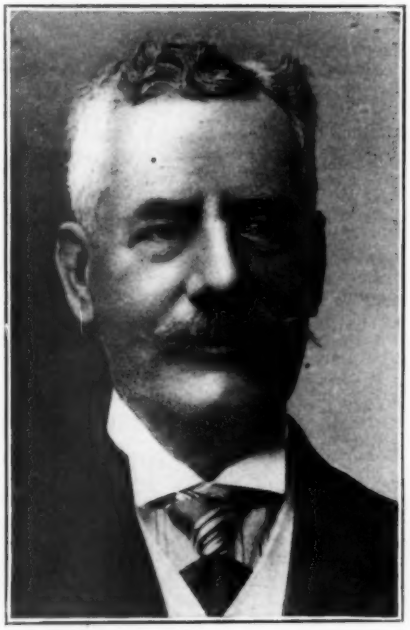
ing secretary, National Paving Brick Manufacturers' Association, Indianapolis, Ind.

Thursday morning. "Concrete Pavements, the Blome Method," by H. S. Dewey, of the Rudolph S. Blome Co., New York City; "The Hassam Pavement," by Claude A. Magill, former manager Connecticut Hassam Paving Co., New Haven, Conn.; "New Methods of Constructing Asphalt Pavements," by G. H. Lutz, general manager Equitable Asphalt Maintenance Co., Kansas City, Mo.; "The Mineral Rubber Asphalt Pavements of Chicago," by Linn White, engineer South Park Commission, Chicago, Ill.; report of the committee on city government and legislation, Horace Andrews, chairman, Albany, N. Y.; "History and Operation of the Des Moines Plan," by W. W. Wise, Des Moines, Ia.; report of the committee on municipal franchises, Chas. Carroll Brown, chairman, and "A Modern American Public Service Franchise," by Chas. Carroll Brown, consulting engineer, Indianapolis, Ind.; "A Municipal Franchise Is a Valuable Asset and Should Be Treated So by Those in Authority," by Isaac R. Breen, city attorney, Watertown, N. Y.

The officers elected were as follows: James Owen, Montclair, N. J., president; Julian Kendrick, Birmingham, Ala., first vice president; Fred Giddings, Atchison, Kan., second vice president; E. A. Kingsley, Little Rock, Ark., third vice president; A. P. Folwell, secretary, New York; E. S. Rankin, treasurer, Newark, N. J.; W. J. Parkes, Pine Bluff, Ark., chairman of finance committee.

The new members elected were as follows:

Concord, N. H.—Alfred Clark, Commissioner of Highways.
Beverly, Mass.—Harrie L. Whitney, City Engineer.
Boston, Mass.—Joshua Atwood, Chief Paving Division of Street Department.
Albany, N. Y.—Wallace Greenalch, Commissioner of Public Works.
Brooklyn, N. Y.—Geo. T. Hammond, Designing Engineer, Bureau of Sewers.
Corning, N. Y.—Robt. H. Canfield, Superintendent of Public Works.
Elmira, N. Y.—Thurber A. Brown, Acting City Engineer.
Jamaica, N. Y.—Herman K. Endeman, Assistant Engineer, Queens borough.
New York City—Francis P. Smith, 24 E. 21st St., Consulting Chemist; L. L. Tribus, 86 Warren St., Commissioner of Public Works, borough of Richmond; W. C. Parmley, Consulting Engineer, 78 5th Ave.
Port Richmond, N. Y.—Wm. R. Hillyer, Assistant Commissioner of Public Wks.
Poughkeepsie, N. Y.—Robt. Ridgeway, Department Engineer, New York Board of Water Supply.
Syracuse, N. Y.—Henry C. Allen, City Engineer.
Troy, N. Y.—E. L. Grimes, City Engineer.
Yonkers, N. Y.—Samuel L. Cooper, City Engineer.
Rochester, N. Y.—J. H. Grant, Special Assistant City Engineer.
Atlantic City, N. J.—John W. Hackney, City Engineer; A. M. Heston, City Comptroller.
Hoboken, N. J.—Eugene Smith, City Surveyor.
Montclair, N. J.—Kenneth D. Owens, C. E.
Newark, N. J.—Geo. H. Gardner, C. E.; J. B. Morris, Surveyor and Secretary to Commissioner of Assessment.
Rutherford, N. J.—R. H. M. Watson, Borough Engineer.
Phillipsburg, N. J.—Robert P. Howell, Town Engineer.
South Orange, N. J.—Edmund R. Halsey, Town Engineer of Irvington, N. J.
Ridgewood, N. J.—John T. Hanks, Secretary Board of Health.
Somerville, N. J.—Joshua Doughty, Jr., County Engineer, Somerset Co.
Norristown, Pa.—S. C. Corson, Borough Engineer.
Pittsburg, Pa.—Chas. M. Reppert, Assistant Engineer, Department of Public Works; Chas. F. Taylor, 900 Lewis Bldg., Engineer of several boroughs; N. S. Sprague, Superintendent Bureau of Construction.
Reading, Pa.—E. H. Beard, City Engineer.
Titusville, Pa.—Herbert A. Holstein, City Engineer.
Wilkes-Barre, Pa.—Thos. A. Barrett, Street Commissioner.
Williamsport, Pa.—Jas. F. Fisher, City Engineer.
Carlisle, Pa.—Clarence A. Bingham, Borough Engineer.
Wilmington, Del.—Alex. J. Taylor, Engineer in charge of sewers; Wm. J. Horrigan, Assistant Engineer Street and Sewer Department.
Lynchburg, Va.—H. F. Shaner, City Engineer.



FRED GIDDINGS, ATCHISON, KAN.
Second Vice-President A. S. M. I.

Asheville, N. C.—B. M. Lee, City Engineer.
Charlotte, N. C.—Jos. Firth, City Engineer.
Winston, N. C.—John N. Ambler, City Engineer.
Greenville, N. C.—Wm. D. Neves, City Engineer.

Charleston, S. C.—Jas. H. Dingle, City Engineer.
Columbia, S. C.—G. E. Shand, C. E.
Albany, Ga.—R. J. Edgerly, City Engineer.
Atlanta, Ga.—Henry L. Collier, Commissioner of Public Works; R. H. Norcross, 1623 Candler Bldg., Engineer Municipal Installations.
Brunswick, Ga.—Joe B. High, City Engineer and Commissioner of Public Works.
Columbus, Ga.—Rhodes Browne, Mayor.
Daytona, Fla.—D. D. Rogers, City Engineer.
Birmingham, Ala.—B. B. Meriwether, Engineer Birmingham Realty Co.; M. Nicholson, City Engineer.
Montgomery, Ala.—A. R. Gilchrist, City Engineer.
Austin, Tex.—Geo. S. Iredell, City Engineer.
Dallas, Tex.—M. C. Erwin, Designing Engineer; Chas. S. Wadworth, Consulting Engineer; J. M. Preston, City Engineer.
Neenah, Wis.—H. L. Sweet, City Engineer.
Racine, Wis.—P. H. Connolly, City Engineer.
Watertown, Wis.—E. B. Parsons, Consulting Engineer.
Cleveland, O.—Robt. Hoffman, City Engineer.
Columbus, O.—Henry Maetzel, City Engineer.
Sandusky, O.—Clifford M. King, Chief Engineer Board of Public Service.
Terre Haute, Ind.—E. B. Schmidt, City Engineer.
Chicago, Ill.—John B. Hittell, Chief Engineer of Streets; Linn White, Chief Engineer South Park Commissioners.
Granite City, Ill.—Edmund Hall, Engineer Board of Local Improvements.
Moline, Ill.—Clark G. Anderson, City Engineer.
Des Moines, Ia.—W. W. Wise, ex-member Board of Public Works.
Jackson, Tenn.—Atwell Thompson, City Engineer.
Johnson City, Tenn.—L. N. Wilson, City Engineer.
Knoxville, Tenn.—Samuel D. Newton, City Engineer.
Memphis, Tenn.—J. H. Weatherford, City Engineer.
Nashville, Tenn.—Wm. W. Southgate, City Engineer.
Hot Springs, Ark.—Frank V. P. Ellsworth, City Engineer.
Little Rock, Ark.—Edgar A. Kingsley, City Engineer.
Lexington, Mo.—Jos. A. Wilson, City Engineer.
Hobart, Okla.—O. E. Noble, City Engineer.
Shawnee, Okla.—Frank D. Brown, City Engineer.
Billings, Mont.—Henry Gerharz, City Engineer.
Butte, Mont.—Alex. Leggat, City Engineer.
Ogden, Utah.—A. F. Parker, City Engineer.
Provo, Utah.—Elmer A. Jacob, City Engineer.
Salt Lake City, Utah.—Louis C. Kelsey, City Engineer.
Aberdeen, S. D.—D. Cuyler Washburn, City Engineer.
Berkeley, Cal.—W. F. McClure, City Engineer.
Toronto, Ont.—J. J. Ward, member of Board of Control.

Associates:

New Haven, Conn.—Claude A. Magill, Gen. Mgr. Conn. Hassam Paving Co.
New York City.—Walter B. Harris, Gen. Mgr. Warren Chemical & Mfg. Co.; Imperial Road Co., W. B. Spencer, Pres., Harold B. Weaver, Sec.; Power Specialty Co., 111 Broadway, W. S. Gurnee, Jr.; Newton Jackson, U. S. Wood Preserving Co.; Leslie B. Farr, Harlem Contracting Co.; Wm. W. Medill, General Contractor; Coleman Meriwether, Pres. Lock Joint Pipe Co.
Atlantic City, N. J.—Wm. J. Cherry, Pres. United Paving Co., and R. H. Parker.
Newark, N. J.—Ralph Hoyt, 11 Chambers St., Gen. Supt.; J. M. Sheffle, Pres. Jersey Paving Corporation.
Morristown, N. J.—H. S. Land, Chief Engineer U. S. Wood Preserving Co.
Philadelphia, Pa.—H. A. Miner, Pres. Steel Protected Concrete Co.
Chicago, Ill.—Standard Asphalt and Rubber Co., G. D. Carr; Rudolph S. Blome Co., Unity Bldg.
Minneapolis, Minn.—C. F. Boyce, Asst. Engr. Decarie Incinerator Co.; Kettle River Quarries Co., 954 Security Bank Bldg., F. M. Barnard and Walter Buehler.
Milwaukee, Wis.—Kindling Machinery Co., Jas. T. Bannan, Sec.
Nashville, Tenn.—Alfred H. Johnson, Gen. Mgr. Southern Bitulithic Co.
Kansas City, Mo.—G. H. Lutz, Gen. Mgr. Equitable Asphalt Maintenance Co.

Only twenty-five members and ten associates in this list were present at the meeting. Other members and visitors present were as follows:

Concord, N. H.—W. B. Howe, City Engineer.
Albany, N. Y.—Horace Andrews, Consulting Engineer.
New York City.—J. W. Howard, Consulting Engineer, 1 Broadway; Geo. W. Fuller, 170 Broadway; A. W. Dow, 24 E. 21st St., Consulting Chemist; Geo. C. Whipple, 220 Broadway, Consulting Engineer; Geo. W. Tillson, Chief Engineer of Highways; A. P. Folwell; C. D. Pollock, Asst. Engr., Bureau of Highways.
Rochester, N. Y.—Edwin A. Fisher, City Engineer; Frederick T. Elwood; Joseph E. Putnam.
East Orange, N. J.—Wm. Solotaroff, Engineer Shade Tree Commission; James Owen, C. E.
Newark, N. J.—Edward S. Rankin, Engineer of Sewers; Wm. A. Howell, Engineer of Streets; John B. Stobaeus; A. F. Eggers; C. V. Baumann; Thos. F. Halpin; Geo. H. Lambert; Morris R. Sherrerd; Arthur R. Denman; Frank J. Bock.
Erie, Pa.—Ben E. Briggs, City Engineer.
Wilmington, Del.—Leslie V. Christy.
Richmond, Va.—Geo. O. Tenney.
Winston-Salem, N. C.—J. L. Ludlow, C. E.
Birmingham, Ala.—Julian Kendrick, Engineer Blome Concrete Co.; J. E. McCartney, Street Commissioner.
Gadsden, Ala.—W. M. Wilson, City Engineer.
Indianapolis, Ind.—Charles Carroll Brown, Editor MUNICIPAL ENGINEERING.
Atchison, Kans.—Fred Giddings, City Engineer.
Hamilton, Ont.—E. G. Barrow, City Engineer.
Toronto, Ont.—C. H. Rust, City Engineer.

Associates and guests.

Boston, Mass.—Geo. C. Warren, Pres. Warren Brothers Company.
New York City.—H. Tipper, The Texas Co.; E. H. Thomas; W. G. Bickell, Barrett Mfg. Co., 1205 Land Title Bldg.; M. N. Baker, *Engineering News;* S. Whinery, Consulting Engineer.
Newark, N. J.—Wm. H. Gilligan; E. C. Stremple; A. M. Reynolds, Jr.

Rutherford, N. J.—C. R. Soley.
Philadelphia, Pa.—John C. McAvoy.
Richmond, Va.—Geo. O. Kenney.
Grand Rapids, Mich.—Edward H. Christ.
Jackson, Mich.—B. F. Granger, Reinforced Concrete Pipe Co.
Green Bay, Wis.—W. W. Reed, City Engineer.
Indianapolis, Ind.—Will P. Blair, Sec. National Assn. of Paving Brick Mnfrs.

The exhibitors and other firms represented included the Power Specialty Company, 111 Broadway, N. Y., with models of the Heenan-Froude refuse destructors. represented by W. S. Gurnee, Jr., and E. Vail Stebbins; the Barrett Manufacturing Company, with exhibits of tarvia for roads, represented by W. G. Bickell; the Reinforced Concrete Pipe Company, of Jackson, Mich., with a full exhibit of their product, represented by B. F. Granger; the National Association of Paving Brick Manufacturers, with many samples of kinds of brick, and of methods of filling joints with cement filler, represented by Will P. Blair; S. Cameron Corson with a patent sewer catch basin; Warren Brothers Company, showing bitulithic pavement, represented by Geo. C. Warren, president; the Standard Asphalt and Rubber Company, Chicago, Ill., showing brick pavement filler and their new mineral rubber pavement, represented by G. D. Carr; the Imperial Road Company, New York, represented by W. B. Spencer, Harold B. Weaver; the Hassam Paving Company, exhibiting their form of concrete paving, represented by Claude A. Magill; the U. S. Wood Preserving Company, wood block pavements, represented by Newton Jackson; the Lock Joint Pipe Company, represented by Coleman Meriwether; the Steel Protected Concrete Company, represented by H. O. Miner; the Kettle River Quarries Company, creosoted block pavements, represented by F. M. Barnard and Walter Buehler; the Kindling Machinery Company, with exhibit of the squeegee street cleaner, represented by Jas. T. Brannan.

The New England Water Works Association.

The twenty-seventh annual convention of the New England Water Works Association was held at Atlantic City, N. J., September 23, 24 and 25. The program included the following papers: "Water Purification at Philadelphia," John C. Trautwine, Jr., C. E., Philadelphia; report of committee on conservation of the natural resources of the country, followed by "The Conservation of Water Resources," Marshall O. Leighton, chief hydrographer, United States Geological Survey, Washington, D. C.; report of committee on standard specifications for fire hydrants, followed by "History of the Haverhill Water Works," Albert L. Sawyer, water registrar Haverhill, Mass.; "Rubber Pipe Joints," R. S. Weston, sanitary expert, Boston, Mass.; "Covered Reservoirs; Some Experience in the Use of Concrete in Their Construction and in Making Them Watertight," Frank L. Fuller, C. E., Boston, Mass.; "Meters and Water Consumption of the Hartford Water Works," Ermon M. Peck, distribution engineer, Hartford, Conn.; "Meter Rates," W. W. Richards, engineer and superintendent, New London, Conn.; "The Water Service and Insurance Rates," Frank A. Barbour, C. E., Boston, Mass. The report of the committee on awards made for damages resulting from the division of water was followed by papers, as follows: "Stream Flow Data," Charles E. Chandler, C. E., Norwich, Conn.; "The Adjustment of Damages for Stream Diversion by Storage Compensation," Robert E. Horton, hydraulic engineer, Albany, N. Y.; reports of committee on awards that have been made in waterworks valuation cases.

Good Roads Convention.

A good roads convention was held at Atlantic City, N. J., September 25 and 26, under the auspices of the Associated Automobile Clubs of New Jersey, with the cooperation of the New Jersey Automobile Trade Association, the New Jersey State Grange Freeholders and County Engineers. The session on good roads included addresses, as follows: "From the Granger Viewpoint," G. W. F. Gaunt; "From the Road Driver Viewpoint," James M. Beldon; "From the Citizen Viewpoint—The Dweller Along the Way," Frank Bergen, Elizabeth, N. J. Road construction session, "How it is Accomplished in Pennsylvania," R. D. Beevan, deputy state highway commissioner, Harrisburg, Pa. "How It is Accomplished in New York," assistant to Frederick Skene, state engineer and surveyor, Albany, N. Y.; "What a New Jersey Engineer Would Do," James E. Owen, Newark, N. J.; "What the Federal Government is Doing," Allerton S. Cushman, acting director public roads department of agriculture, Washington, D. C.; "The Ideal Construction," George C. Diehl, county engineer, Buffalo, N. Y.; "The Ideal New Jersey," Calvin Tomkins; "Asphalts for Dustless Roads," T. Hugh Boorman.

In his address on "The Ideal Construction," George C. Diehl said that asphalt in some form will be the future material for state roads. He declared that asphalt mixed well with stone and other materials make a durable and elastic road.

Dr. Allerton S. Cushman, in his address on "What the Federal Government is Doing," said.

There are 2,151,570 miles of public roads in the United States. Of this mileage statistics for the year 1904 show that about 7 per cent. are improved. We may infer from this that about 93 per cent. of the roads in the country are bad roads. During the crop year 1905-06, 85,487,000 pounds of farm products were hauled over common roads from farms to shipping points. It is evident that the slightest saving in cost of hauling per ton would assume striking proportions when con-

sidered for the entire country. Figures show that these great crops traveled in wagons over the country roads 208,432,644 miles, and investigations have established the fact that the average cost of hauling per ton mile is about 25 cents; on stone roads, dry and in good order, about 8 cents; on stone roads in ordinary condition, 12 cents; on earth roads, containing ruts and mud, 39 cents; on sandy roads, when wet, 33 cents; on sandy roads, when dry 44 cents. A reduction in the cost of hauling from 25 cents to 12 cents would mean an average saving of over $250,000,000.

The public roads of a commonwealth are legitimately intended to be used for pleasure, for the development of social intercourse, for the broadening effects of travel and intimate knowledge of our own country, and for enabling us to pursue the beautiful and picturesque in nature. The automobile, without any doubt, has done more to develop the usefulness of the common roads from this point of view than all other influences combined. Unquestionably the automobile has brought up new problems to be confronted by the road builder and engineer. The systems of construction of stone roads developed by the great engineers whose names will ever live in the history of engineering—Tresauget, Telford and Macadam—were not designed to carry the heavy shearing traction of self-propelled vehicles. To this shearing force developed by the driving wheels of the mechanically impelled vehicles is due the rapid disintegrating effects which have become a matter of common observation wherever automobiles are used to a large extent. You are undoubtedly aware that following this observation a hue and cry has been raised throughout the length of the land condemning the automobile and agitating for legislation which will have the effect, either to some degree of preventing the use of these vehicles, or by some method of taxation, making the automobile responsible for the expenditures which fall upon the public treasury to maintain the roads in good condition.

Fair-minded students of this condition have, however, concluded that though the automobile is, to a certain extent, a good destroyer, it is at the same time doing more than any other influence to bring about a correction of the evils which have followed in its wake. Engineers all over the world are turning their attention to methods of construction which will meet the modern condition and that successful results have already been obtained and are constantly being pushed further I need not remind you.

The dust problem did not begin with the introduction of the automobile, although it has undoubtedly been accentuated by this mode of travel. There are sections of our country at this present where the roads have been rendered practically dustless, and neither horse-drawn vehicles nor automobiles can now deposit the dirt of the highways in the gardens and houses of abutting property owners. This condition of affairs did not exist before the introduction of the automobile, but has been arrived at in answer to the demand which has followed its use. In short, there are many suburban communities in which life today is far more agreeable than it was before automobiles came into use. That dust is a disease carrier there can be no doubt, and it is necessary that we should expend all of our energies toward its suppression. It should be remembered that the automobilist is not a dust maker, but he is a dust raiser, and therefore it is especially incumbent upon him that he should co-operate in every possible way, bringing all his influence to bear to encourage the suppressing of this dangerous nuisance.

Resolutions were passed by the convention and organizations represented, pledging their support, moral and active, in all movements tending towards the improvement of the highways and development of systems of highways.

Technical Meetings.

At the regular meeting of the Brooklyn Engineers' Club, held at Brooklyn, N. Y., October 8, Herbert C. Keith presented a paper entitled "Some Features of the Bridges of the Harlem River Branch, New York, New Haven, and Hartford Railroad."

The second Cement Show will be held in Chicago February 18, 19, 20, 21, 22, 23, and 24. Diagrams have been prepared showing the division of space and are being distributed among prospective exhibitors. Over 250 exhibitors can be accommodated this year in the Coliseum. The spaces have been so arranged that exhibitors have the advantage of the largest possible frontage on the aisles for their display, the spaces being of less depth than heretofore. It has been found possible, by following this plan, to increase the number of spaces. Negotiations are now in process to secure some concessions from the railroads in the matter of reduced rates.

At a general meeting of the members of the Institution of Municipal Engineers to be held October 9, in London, England, the confirmation of certain by-laws was expected. At a meeting of the executive committee of the Institution, held September 17, it was decided that, recognizing the great possibilities of an Institution of Municipal Engineers in the widest sense of the term, men holding important appointments under local authorities, as electrical, gas, mechanical and water engineers, should be eligible for election to membership of the Institution. Particulars of the aims and objects of the Institution, together with forms of application for membership, may be obtained of B. Wyand, secretary, 10 Eagle Place, Piccadilly, London, W.

The second annual convention of the American Peat Society was held at Toledo, Ohio, October 22, 23, and 24. The program included papers on peat gasifying, peat coking, peat drying, alcohol and ammonia from peat, and the commercial outlook of the present peat industry. Julius Bordolle, secretary, Kingsbridge, N. Y.

The fifth annual convention of the Northwestern Cement Products Association will be held March 2, 3, and 4, 1909, the place of the meeting to be determined upon later by a committee composed of J. C. Van Doorn, C. A. P. Turner, O. U. Miracle, and Harvey B. Smith. This was decided upon at a recent general meeting

of the executive committee of the association, held at Minneapolis. The association has decided to present to the Minnesota State Fair a concrete building, to be used solely for cement products exhibits. A committee was appointed to select a site on the fair grounds for the building, composed of the following: H. A. Rogers, E. Cobb, J. C. Van Doorn, and D. L. Bell. A committee to draw plans includes C. A. P. Turner, O. U. Miracle, and L. V. Thayer.

The annual meeting of the American Society of Mechanical Engineers will be held in New York City, December 1, 2, 3, and 4. Calvin W. Rice, secretary, 29 W. Thirty-ninth Street, N. Y. City.

At a meeting of the American Society of Civil Engineers, October 7, in New York City, O. S. Lyford, Jr., of Westinghouse, Church, Kerr & Co., presented a paper entitled "Catenary Trolley Construction," descriptive of the construction employed in the electrification of the Denver & Interurban R. R. running from Denver to Boulder, Colo.

At a meeting of the Western Society of Engineers, October 7, at Chicago, L. R. Stowe read a paper on "Methods of Studying the Heat-Absorbing Properties of Steam Boilers."

The International Road Congress opened its first official session in Paris, France, October 12. Delegates representing twenty-four countries, including the United States, Brazil, Mexico, Chili, India, and Japan were present.

The third biennial meeting of the American Public Works Association was held at Asheville, N. C., September 29 and 30.

Officers were elected September 25, at a special convention of the International Brotherhood of Electrical Workers, as follows: General President, J. J. Reid, Erie, Pa.; general secretary, J. W. Murphy, Cleveland, O.; general treasurer, F. J. Sullivan, Cleveland; vice president, Oliver Meyer, Ashtabula, O. The regular convention will be held hereafter every two years, instead of every five years.

The joint annual meetings of the National Municipal League and the American Civic Association will be held in Pittsburg, Pa., November 17, 18, 19, and 20. The program has been arranged to cover a wide range of subjects, including the following: "Public Utilities Commissions," "The Conservation of Natural Resources," "Charter and Electoral Reforms," Instruction in Municipal Government," "The Bureau of Municipal Research Idea," "Militant Citizenship," "A Municipal Sanitation Program," "The Pittsburg Survey," Municipal Affairs and the Liquor Problem," "City Planning," "The Playground Movement." Clinton Rogers Woodruff, secretary, North American Bldg., Philadelphia.

At a meeting of the Engineers' Club, at Minneapolis, Minn., October 19, Fred H. Bass, professor of municipal engineering at the University of Minnesota, gave an address on "Water Supply in the Vicinity of the Twin Cities."

At the meeting of the Municipal Engineer of the city of New York, held October 28, Geo. A. Johnson presented a paper on "Municipal Water Works of the Far East," and illustrated it with lantern slides.

The next convention of the National Brick Manufacturers Association will be held in Rochester, N. Y., February 1 to 6, 1909. F. T. Randall, secretary, Indianapolis, Ind.

The National Association of Cement Users will meet in Cleveland, O., January 11-16, 1909.

American Institute of Electrical Engineers.

At the New York meeting of the American Institute of Electrical Engineers, October 9, P. Junkerfeld and E. O. Schweitzer presented a paper on "High Potential Underground Transmission," describing the 9,000-volt and 20,000-volt three-phase cable mains of the Commonwealth Edison Company, of Chicago, which supply respectively the inner district (within 10-mile radius) and the outer district. The 9,000-volt cable lines, supplying forty-four converter sub-stations aggregate 272 miles in length; the 20,000 volt cable, fed from the 9,000-volt system, is 11 miles long. Additions now under construction will bring these amounts up to 340 and 55 miles. All of these are three-core, paper-insulated cables, laid in tile conduit. The current is 25 cycles. The two power stations of the system have an aggregate capacity of 118,00 kw. In five and one-half years forty-four burnouts occurred on the cables, twenty-five of them being due to external causes, and only nineteen to the cable itself. The most frequent sources of trouble are from without, and of these electrolysis is apparently the most persistent.

A series of oscillograph and spark-gap studies was made on the cables, the former to observe the effects of switching, etc., in causing potential rises, and the latter to learn the frequency of supernormal voltages at different points of the network. The observations are described and discussed at some length, with the following general conclusion: Pressure-rises of more than 100 per cent. occur occasionally on the 20,000-volt line, and also, though more rarely, on the 9,000-volt lines; in neither case are they chargeable to switching, so far as the oscillograms show. The observations will be continued after the extension of the 20,000-volt line is completed.

Civil Service Examinations.

The U. S. Civil Service Commission will hold examinations at the usual places as follows:

November 16, 17: Assistant in Naval

Observatory, Washington, D. C., at $1,000 a year.

November 25: Three or more vacancies as office engineer in irrigation and drainage investigations, office of experiment stations, Department of Agriculture, Washington, D. C., at $1,200 to $2,000 a year; laboratory assistant qualified in optics, bureau of standards, at $900 to $1,200 a year.

December 2, 3: Junior engineer in technologic branch of Geological Survey at $840 to $1,200 a year.

Personal Notes.

Daniel McDonald has been elected superintendent of water works at Middletown, Conn.

B. E. Smith has been elected city engineer at Warren, Ohio, succeeding E. M. Milligan, resigned.

John B. Heim has been elected superintendent of the city water works, at Madison, Wis., for his twenty-sixth term.

Frederick A. C. Perrine, M. Am. Inst. E. E., died at his home in Plainfield, N. J., October 20, of Bright's disease, aged 46 years.

Cornelius Burke has been appointed commissioner of sewers in Queens borough, New York City, succeeding John J. Halleran.

Frederick K. Wing, of Buffalo, N. Y., has been appointed engineer of the sewer system under course of construction at Lancaster, N. Y.

James A. Lipscomb has resigned as city engineer at Manchester, Va. Charles Burkert has been appointed superintendent of the water department of that city.

Alfred Stone, a member of the executive committee of the National Fire Protection Association during 1905, 1906, 1907, and 1908, died at Peterboro, N. H., September 4.

L. B. Marke, M. Am. Inst. E. E., and J. E. Woodwell, Assoc. Am. Inst. E. E., have established offices as consulting, electrical and illuminating engineers in the Terminal Bldg., Forty-first street and Park avenue, New York City.

Paul L. Wolfel, for a number of years associated with the Pencoyd Iron Works and later with the American Bridge Company, has been recently appointed chief engineer of the McClintic-Marshall Construction Company, with headquarters at Pittsburg.

William Keuffel, president of the Keuffel & Esser Co., manufacturers of drawing materials, mathematical and surveying instruments, measuring tapes, etc., Hoboken, New Jersey, died October 1.

Julius Fix, superintendent of water works at Waukesha, Wis., has resigned to accept a position with the Terre Haute Water Company, Terre Haute Ind., and was succeeded by B. B. Hayford.

Mr. William J. Roberts, M. Am. Soc. C. E., sanitary engineer, Washington State Board of Health, has resigned his position in the civil engineering department of the State College, at Pullman, Wash., to engage in water supply and irrigation engineering. His present address is Medford, Ore.

MACHINERY AND TRADE

Injunction Against the Passaic Valley Sewer Outlet Is Asked.

A petition was filed with the supreme court of the United States, October 13, for an injunction to restrain the state of New Jersey from constructing a trunk sewer discharging crude sewage into New York Bay. The action was taken at the request of Edward Hatch, Jr., of the Merchants' Association of New York, who has, for the last two years, opposed at every step the efforts of the Passaic Valley Sewerage Commission to relieve the pollution of the Passaic river by the construction of a trunk sewer.

The reasons alleged for opposition to the construction of the proposed trunk sewer are that the waters surrounding New York City are already so polluted by sewage as to be dangerous to life and health; that the solid matter contained in the sewage now discharged into the bay caused a serious shoaling of the barbor channels; that some species of fish, such as shad, practically have been driven from these waters, while the fear of infection with disease has greatly injured the shellfish industry. All these evils, according to the petition, would be increased by the discharge from the proposed sewer of 350,000,000 gallons of sewage daily.

The application for the injunction is based upon a compact between the state governments of New York and New Jersey, in 1833, under which New Jersey surrendered to New York all police and sanitary jurisdiction of the land below low-water mark along the New Jersey shore, from a point opposite the northern end of Manhattan Island to Perth Amboy. Robbins' Reef, at which it is proposed that the new sewer shall discharge its contents, is within this territory.

The proposed trunk sewer scheme has,

for years, been fought through the New Jersey legislature, with the city of Paterson strenuously opposing it on one side, and the city of Newark as strenuously urging it on the other. By authority of the legislature, under final agreement between the two municipalities, a commission was appointed five years ago by Governor Murphy to proceed with the work. Little more has been accomplished, however, than the surveying of the territory, although many of the municipalities that would be benefited by the scheme have signified their intention to enter into it, with the exception of Paterson, and that city recently made a proposition to come into the scheme provided its portion of the cost would not exceed a certain amount. The commission, according to recent local press reports, refused to let Paterson make her own terms, and it is now believed she will enter into the agreement without further opposition.

Some New Types of Corrugated Bars.

Corrugated rounds and corrugated squares are the latest types of mechanical bond reinforcing bars developed by the

SQUARE AND ROUND CORRUGATED BARS.

Expanded Metal and Corrugated Bar Company, Frisco Building, St. Louis. These two bars, illustrated below, represent the highest type of efficient mechanical bond reinforcement. The sections adopted are such as give maximum bonding strength with the concrete with a minimum amount of material for bond only. These bars also have decided advantages which tend to quicker and better construction. In the matter of bending for instance; everyone appreciates the difficulties encountered in bending plain round bars, and especially twisted bars, so as to keep all the bends in one plane. This trouble is entirely overcome in these two types of bars, both the corrugated squares and the corrugated rounds tend to bend in a plane.

Corrugated bars are rolled from billets of open hearth, or bessemer steel, to meet requirements as to elastic limit, etc. Unless otherwise specified, however, bars with an elastic limit of 50,000 pounds and an ultimate strength of 90,000 to 100,000 pounds per square inch are furnished. It is hardly necessary to call attention to the mechanical bond features of the corrugated bar—it has been recognized as the standard deformed bar for many years. An inspection of the illustration will convince the observer that the bonding value is really a function of the shearing strength of the concrete.

This company has also recently inaugurated the practice of selling fabricated reinforcement, that is, the complete reinforcement required for any structure, bars and stirrups, bent, ready to place in the forms. This method of purchasing reinforcing steel has many advantages; the engineer or architect is assured of accurate work, and the contractor is relieved of all bending on the job.

Concrete Mixer for Street Paving.

The Koehring Machine Company, Milwaukee, Wis., have on the market a concrete mixer, specially designed for use in connection with street paving. The mixer is built in such a manner that it can be worked on very narrow streets, as it does not require a platform or gangway planks. It is made with all steel gears, and constructed entirely of steel and iron. It is furnished with either steam or gasoline engine power equipment, and is guaranteed by the manufacturer for a term of two years. Some interesting printed matter, describing this mixer, can be obtained by addressing the Koehring Machine Company, 501 Germania Bldg., Milwaukee, Wis.

Bitulithic at Atlantic City.

Warren Brothers Company, the builders of bitulithic pavements, were represented at the Atlantic City convention of the American Society of Municipal Improvements by George C. Warren, the president of the company, and consequently took a prominent place in the convention. The best exhibit of the company was

Atlantic avenue, the principal street of the city, with the traffic of the business houses, the many conveyances from the hundreds of hotels to railroad stations, a double track street railway, etc. The construction of this street was began two years ago and its condition when inspected by the members of the association was apparently perfect.

Mr. Warren distributed the literature of the company, and better yet he shared with the interested attendants at the sessions of the convention his great knowledge of paving materials and methods, particularly asphalt and bitulithic, and always had an attentive audience about him. The bitulithic name will be kept on many desks on the back of a unique artificial stone blotter for letter signatures.

Alcohol from Natural Gas.

The benefits of natural gas can be carried to localities far removed from the gas fields, according to the plans of the Continental Natural Gas Alcohol Co., of Wheeling, W. Va. The company's chemist, Carl von Hartzfelt, has devised a method of transforming methane, of which natural gas contains about 94 per cent., into denatured alcohol, which can be transported and used as other alcohol and gasoline are manipulated. Assuming that natural gas costs 10 cents a thousand cubic feet, the raw material for the alcohol costs one cent a gallon. The distilling process does not seem to be expensive, and the claim is made that the alcohol can be made, sold and used in competition with gasoline.

Mr. von Hartzfelt will doubtless give full details regarding the apparatus, methods and cost if addressed at Wheeling, W. Va. He also designs and constructs stills for producing alcohol from vegetable waste matter.

Reinforced Concrete Pipe.

The Lock Joint Pipe Co., 165 Broadway, New York, was represented at the convention of the American Society of Municipal Improvements by Coleman Meriwether, the designer of the system of continuous reinforced concrete pipe used by this company. Samples of the pipe and of the reinforcement, showing all details, were on exhibition, and Mr. Meriwether's explanations made the advantages of the system clear to the interested members of the association. Expanded metal or other suitable reinforcing fabric may be used, and it is placed toward the interior of the section, where it receives the greatest tension in the arch of the pipe, and it extends throughout the length of the pipe into the bell and out of the spigot of each section. When the sections are put together, their reinforcement overlaps in a dove-tailed recess, which is filled with concrete from the interior of the conduit, thus locking and sealing the adjacent sections in one operation, and giving a smooth, continuous invert, with an absolutely tight joint, free from cracks and offering no obstruction to the flow of water in the sewer. Back filling can be done before the pipe is locked and sealed, since this operation takes place from the inside. The sizes made run from 24 to 72 inches diameter.

Three sections of 36-inch pipe, supported only near the outer ends of the outside sections and loaded on the middle section, carried 10,550 pounds, with no sign of crack or failure in either pipe or joints.

Besides the New York office, the company have representatives in Seattle, Oakland, Los Angeles and Louisville, from whom information can be obtained.

The New Flushovalve.

Embodying new mechanical principles, the flushovalve, a new closet flushing device, manufactured by the Flushovalve Co., 45 West Thirty-fourth st., New York, is a very excellent device, and is to all intents and purposes a well and substantially constructed water meter, so sensitive in action that by easy adjustment from the outside, without turning off the water, it can be made to measure the supply of water to the bowl, yielding the same quantity at all times, and the flush increased or diminished as may be desired.

When the flushovalve closes there is absolutely no noise. It opens against the pressure and closes with it, being perfectly automatic in operation. The construction is very simple and there is nothing to get out of order, and the valve can be taken apart by removing the top cap and lifting out the piston.

The Flushovalve Company are meeting with great success in placing their valve upon the market, and, although a young company, have secured the specification of a large number of their valves in New York and elsewhere within the last two months.

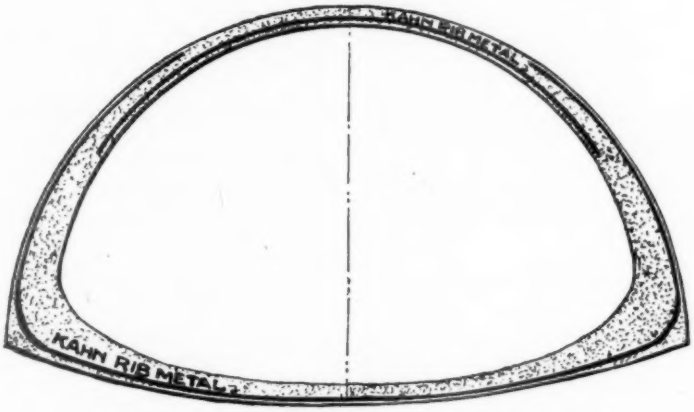
Rib Metal for Sewers.

Rib metal is one of the Kahn system products, manufactured by the Trussed Concrete Steel Company, of Detroit.

Rib Metal is expanded from a special rolled section of the highest grade of open-hearth steel. It consists of a series of nine straight bars, or ribs, rigidly connected by cross ties formed from the same sheet of steel. The cross ties accurately space and thoroughly anchor the main bars in the concrete, providing a perfect cross reinforcement against temperature shrinkage and settlement strains.

Owing to its form it is especially advantageous in the construction of sewers and conduits. The main bars extend around the surface of the sewer, providing reinforcement in the line of the greatest strain.

RIB METAL REINFORCEMENT FOR CONCRETE.



CONCRETE SEWER REINFORCED WITH RIB METAL.

Rib metal is stiff and rigid and will stay in the forms exactly where it is placed, and cannot be dislodged in pouring the concrete. Being in a sheet nine bars wide, it is very easily held in place in the forms.

Where desired, the Trussed Concrete Steel Company will bend the rib metal in their shops to any curve, thus entirely doing away with field labor.

Rib metal is manufactured in seven sizes of mesh, 2, 3, 4, 5, 6, 7, and 8 inch, and in lengths up to 18 feet.

Rib metal is also used as reinforcement for thin floors, slabs, and roofs, and also for solid concrete walls.

Complete information, prices, etc., will be supplied by the Trussed Concrete Steel Company, of Detroit.

Reinforced Concrete Pipe Exhibit.

The exhibit of the Reinforced Concrete Pipe Co., of Jackson, Mich., at the convention of the American Society of Municipal Improvements was in charge of B. F. Granger, who is fully competent, by knowledge and temperament, to show, in the most satisfactory manner, the good points in the old reliable sewer pipe made by the methods of his firm. A full set of specifications for reinforced concrete pipe will be found elsewhere in this number of MUNICIPAL ENGINEERING. The company follows these excellent specifications closely in their work, and the result is good pipe well laid. Many miles are now in use in all parts of the country, under all sorts of conditions, and apparently all of it is giving satisfaction. Mr. Granger

distributed a souvenir paper weight containing a perpetual calendar, as a reminder of the company.

Activity in Asphalt Paving Plants.

The Hetherington & Berner Co., Indianapolis, Ind., have completed and the shipping one of their latest style one-car asplait plants to the Texas Company, Houston, Tex. The plant was put out in the remarkably short time of twenty-eight days from the time order was received. This company have also closed a contract for a paving plant, to be erected in the city of Mexico.

The municipal plant for the city of San Francisco has been duly installed in that city, and is said to be the only example of a first-class paving plant constructed on the Pacific coast.

At the present time the company is finishing a plant for the city of Seattle, which latter plant is expected to be in operation within two weeks.

Brick Paving Before the A. S. M. I.

The proper construction of brick pavements was so well presented to the American Society of Municipal Improvements at its Atlantic City convention by Will P. Blair, the efficient secretary of the National Association of Paving Brick Manufacturers, that the session passed a vote of thanks to that organization for giving the association the opportunity to hear the paper, and the ensuing discussion, in which Mr. Blair showed his thorough knowledge of the advantages of good brick pavements and the methods of laying them, as well as the reasons for the failures to procure the best results which are so frequently observed.

Mr. Blair had with him samples of pavements laid with cement filler, showing the excellence of properly constructed work, and the detailed reasons for this excellence. Some of his samples showed, with equal clearness, the reasons for imperfections.

The association of which Mr. Blair is secretary is doing good work in showing the engineers and municipalities of the country how to get good pavements, and as a consequence the proportion of brick streets laid each year has increased materially, as stated by Mr. Blair in his paper, which is printed at the beginning of this number of MUNICIPAL ENGINEERING. From January 1, to September 1, 1908, the reports of the association showed 4,723,215 square yards of brick pavements constructed east of the Mississippi river. The association compile the most complete reports obtainable anywhere, but acknowledge that a few states and cities are not included in their figures. Probably the figures for the whole year will show something like six million square yards of brick pavements as the total for the year, an amount which will probably exceed the sum of the work of all other hard pavements combined.

Trade Publications.

The Jeffrey Manufacturing Company, Columbus, O., send some well printed and attractively illustrated bulletins, showing the very general use of the Jeffrey coal handling and conveying machinery. The conveying machinery described seems to be particularly well suited for conveying coal, cement clinker, and cement packages.

The Universal Portland Cement Company's bulletin for October contains illustrations of various kinds of concrete work, in which Universal cement was used. Pictures showing a concrete street pavement at Gary, Ind., concrete foundations for ore docks at Two Harbors, Minn., and school buildings in St. Louis and New Orleans are among the attractive features. This bulletin may be had by all who are interested in cement and concrete construction on application to the Universal Portland Cement Company, Commercial Bank Bldg., Chicago, Ill.

"Enamel Concrete" is the title of the very handsome catalogue which comes comes from the Enamel Concrete Company, Des Moines, Ia. The booklet describes an enormous machine for making enamel concrete brick. It is claimed by the manufacturers that a pressure of 3,200,000 pounds can be exerted on each eight bricks, and the normal capacity is 40,000 bricks per day of ten hours. The booklet describes the process and treatment and gives illustrations of the machine.

The Lea Equipment Company send advance sheets of their bulletin describing the Lea-Degen High-Duty Turbine Pump. The bulletin contains a report by James E. Denton, M. E., of Stevens Institute of Technology, of tests made of the pump, which tests should prove very gratifying to the manufacturers, as they show very high efficiency. Full description of the pump, with a copy of the tests mentioned, may be obtained from the Lea Equipment Company, 136 Liberty Street, New York City.

The Consolidated Supply Company, 321 Dearborn Street, Chicago, send advance sheets of their catalogue No. 15, containing a description of general railway and mill supplies and electric railway and mining supplies.

The Harris Smokeless Furnace Company, Nashville, Tenn., send a catalogue describing their smokeless furnace, showing its application in a number of large plants in different parts of the country.

J. Norman Jensen, C. E., Chicago, Ill., sends a sample of his logarthmic cross-section paper on the back of which is a circular describing the use of the paper, and its many advantages, and giving its cost.

The Lesley and Trinkle Co., 603 Pennsylvania Bldg., Philadelphia, Pa., have issued reprints of two papers, describing some extensive concrete construction for grain storage in Baltimore and Buffalo, in which Giant Portland cement was used.

Trade Notes.

ASPHALT.

Kansas City, Mo.—This city contemplates the erection of a municipal paving repair plant for repairing brick, macadam and asphalt pavements. Robert W. Goodnow, secretary B. P. W.

Austin, Tex.—The city council is discussing plans for a municipal paving plant.

BRICK.

Columbia, S. C.—The Granite Brick Co., of this city, was chartered October 1, and will erect a plant for the manufacture of paving bricks and blocks. The officers of the company are: president, E. H. Hyatt; vice president, B. H. Moss, of Orangeburg; secretary and treasurer, J. H. Bollin.

Little Rock, Ark.—W. W. Dickinson contemplates the erection of a paving brick plant here.

Collinsville, Okla.—The Chanute plant of the Coffeyville Brick Co. is to be removed here. Paving brick only will be manufactured.

CEMENT.

Chicago, Ill.—Plans have been prepared by the Universal Portland Cement Co., a subsidiary of the United States Steel Corporation, to double the capacity of its large slag plant at Pittsburg.

Wilmington, Del.—The Havana Cement Products Co. has been incorporated to manufacture cement and acquire limestone quarries, etc.

Chamberlain, S. D.—The Dakota Portland Cement Co. contemplates erecting a large cement plant here.

Mason City, Ia.—The large clay storage building of the Northwestern States Portland Cement Company's plant here was destroyed by fire recently, entailing a loss of $10,000.

San Antonio, Tex.—The San Antonio Portland Cement Co. has awarded a contract to the Henry S. Spackman Engineering Co., of Philadelphia, for erecting a cement plant near here. The factory site embraces about thirty acres, and when improved with the plant, storehouses and dwellings necessary to the operation of the plant proper, it will be known as Cementville. The plant will be in operation by October 1, 1909. C. Baumberger, of this city, is president.

Leeds, Ala.—The Standard Portland Cement Co. is making important improvements to its plant here.

The Chicago Hennebique Construction Co. has been organized to take work in the Hennebique system, working in connection with the Hennebique Construction Co., of New York. The manager of the Chicago company is A. M. Bradford, 1122 The Rookery, Chicago, Ill.

Indianapolis, Ind.—Senor Samuel Garcia Cuellar, of the City of Mexico, and representing the government of Mexico, while in this city recently purchased an asphalt plant of Hetherington & Berner, for the government. It will be shipped to him in three weeks.

CONCRETE BLOCKS.

Heber, Ark.—The Heber Concrete Construction Co. has organized with officers as follows: president, J. C. Copeland; vice president and general manager, W. J. Short; secretary, J. G. McDaniel; treasurer, B. F. Burns.

Duluth, Minn.—The Duluth Cement, Brick and Block Co. has been incorporated by M. B. Cullum, Matt. Minzgohn, John B. Kelly, E. L. Toomy, O. McDonnell, R. W. Nichols and W. H. Wells.

St. Paul, Minn.—The St. Paul Cement Machine Co. has been incorporated by Frank J. and Albert E. Priffner, of St. Paul, and George Ferguson, of Waterloo, Ia.

Fairbury, Ill.—Joe Paternoster will establish a concrete block plant here.

Bozeman, Mont.—A cement block plant will be put into operation by J. M. Lindley.

Chicago, Ill.—The Harvey Stone Co. has been incorporated to do general contracting, manufacturing and mercantile business, by W. B. Tarkington, H. M. Sluch, and Charles Oldenburg.

Chicago, Ill.—The Interlocking Concrete Construction Co. has been incorporated to conduct a general contracting and construction business by Robert Redfield, William H. Sexton, and Henry P. Chandler.

Cold Springs, N. Y.—The Hudson Highland Quarries Co. has been incorporated to quarry and crush stone, and deal in stone, brick, lime and cement, by Clarence H. Sara, William H. Truesdell, and L. Bennett Southard.

Portland, Ore.—The Columbia Crushed Rock Co. has been incorporated by R. J. Moylan, J. T. Moylan, and R. W. Walker.

PROPOSED PURCHASE OF MACHINERY.

West Hartford, Conn.—The town selectmen have authorized the purchase of a steam road roller and sprinkling cart.

Sheboygan, Wis.—This city contemplates the purchase of a number of small scoops, to be used in picking up refuse from the streets, and desires to correspond with manufacturers of the same. C. U. Boley, cy. engr.

Toledo, O.—Special.—A. C. Williams, 163 Burnham ave., West Toledo, advises us that he is in the market for machinery and tools for concrete and cement work, and for sewers.

Emeryville, Cal.—Special.—R. S. Hawley is in the market for concrete mixers.

Collinwood, O.—Special.—Fred W. Graf, 888 Stanley street, is in the market for machinery and tools for sewer construction.

PURCHASE OF MATERIALS.

Emeryville, Cal.—Special.—R. S. Hawley advises us that he desires to purchase materials for pavements.

MISCELLANEOUS.

Janesville, Wis.—The Bassett Sand & Gravel Co. has been incorporated to sell cement blocks, bricks, etc., by J. K. Jensen, G. Fred Ehrlinger, and J. R. Jensen.

Nicetown, Philadelphia, Pa.—The name of the Dodge Coal Storage Co. has been changed to the J. M. Dodge Co. James M. Dodge, chairman of the Link-Belt Co., is president.

Great Falls, Mont.—Special.—W. W. Withee and W. S. Cargill, the purchasers of the Conrad lands north of this city, contemplate the building of an electric railway running west of Conrad twenty-five miles. G. Calvin Bower and associates have asked the city council for a franchise for certain streets to enable their interurban railway to enter Great Falls.

SEWER PIPE.

Cannelton, Ind.—A new sewer pipe plant will be established here.

Patents on Concrete Railroad Ties.

857,363. Railway Tie. Albert S. Reavis, Washington, D. C.

858,376. Tie. Theobald G. Fisher, Stratford, Wis.

858,983. Tie and Rail Clamp. Jas. B. Hinchman, Denver, Colo.

859,330. Track Construction for Underground Railways and Tunnels. T. M. K. Overland, New Brighton, N. Y.

861,204. Railway Tie. Samuel M. Coleman, Johnstown, Pa.

862,103. Railway Cross Tie. Thos. W. Pitts, Tampa, Fla.

866,743. Metallic and Concrete Railway Tie and Rail Fastening. Moses Stoner, Warsaw, Ind.

867,435. Railroad Tie. John C. Speaker, Magnolia, O.

870,255. Composite Railway Tie. John Smith, El Paso, Tex.

877,042. Railroad Tie. Gaetano Bossi, Rome, Italy.

877,328. Cross Tie. John F. and Chas. F. Gandy, Greenville, S. C.

IMPROVEMENT AND CONTRACTING NEWS

PAVING.

CONTEMPLATED WORK.

Neenah, Wis.—Forest avenue may be paved with asphalt.

Walla Walla, Wash.—This city contemplates paving four blocks of W. Main street.

Quincy, Ill.—Mayor Best advocated the paving of the streets in South Quincy.

Wenatchee, Wash.—The construction of a number of cement sidewalks is contemplated.

Independence, Ia.—Second avenue., N. E., will be paved with vitrified brick.

Houston, Tex.—Plans have been prepared for paving Congress avenue. T. C. Tarver, cy. engr.

Decatur, Ind.—Council has decided upon the paving of Monroe street with macadam. Mayor France.

Winnipeg, Man.—Asphalt and granolithic paving and other street improvements are contemplated.

Vancouver, Wash.—Council voted to pave more than one mile of Tenth street, and parts of First and Second streets.

Camden, N. J.—The common council has authorized the paving of Mt. Ephriam avenue with Belgian blocks.

Oxford, Mass.—This city voted to issue $25,000 bonds for constructing concrete sidewalks. R. S. Adams, mayor.

Orangeburg, S. C.—The city council has decided to pave Main street with vitrified brick and bids will be asked at once.

St. Joseph, Mo.—Ordinances have been passed providing for the paving of Franklin street and macadamizing of Francis street.

South Omaha, Neb.—Bids will be asked for soon for paving twelve blocks of L street and four blocks of E street with brick block.

Everett, Wash.—The city engineer has been directed to prepare plans and specifications for paving Chestnut street with brick.

Aberdeen, Wash.—The city council has passed a resolution providing for the paving of six blocks of Wiskah street with asphalt.

Odgen, Utah—Ordinances have been passed for constructing cement sidewalks in Second, Seventh, Thirteenth, and Twenty-seventh streets, and Washington and Adams avenues.

Newark, N. J.—The property owners of East Newark have petitioned council to substitute bitulithic for brick paving in Mulock Place.

Emporia, Kans.—The city engineer estimates the cost of paving the street intersections and constructing drainage in four streets at $34,000.

Toledo, O.—Frank I. Consaul, cy. engr., estimates the cost of repaving Auburn avenue at $25,000 for broken stone, and $31,000 for concrete.

Coquille, Ore.—The bids received recently for paving Front street were rejected and now specifications will be prepared and bids asked again.

Great Falls, Mont.—Special.—The city council has passed resolutions directing the improvement of Sixth avenue, S., and the contract will be let this fall.

Los Angeles, Cal.—An ordinance was adopted October 6 for paving three and one-third miles of Sunset boulevard with asphalt on concrete base, with vitrified brick gutters.

Lawrence, Kans.—A resolution has been passed for grading and paving the first alley east of Massachusetts street with brick on concrete base. F. D. Brooks, cy. clk.

Washington, D. C.—The district commissioners will ask Congress for an appropriation of $100,000, for the purpose of paving certain streets and avenues within the city limits.

South Bend, Ind.—A. J. Hammond, cy. engr., is preparing plans for 6,000 square yards of tarviated macadam paving for Leland avenue, and 11,000 square yards of brick paving for Allen street.

Kansas City, Kans.—Council adopted, October 20, the plans of the park board for an extension of the boulevard system, and the expenditure of $54,000 for converting unsightly ponds into lakes.

Lockland, O.—Plans are being discussed for the construction of a boulevard along the west bank of the Miami and Erie canal. Mayor Grown.

St. Joseph, Mo.—W. K. Soitz, asst. cy. engr., is preparing plans for street paving as follows: Twenty-fifth street, 5,885 sq-

yds. of asphalt and 3,000 sq. yds. of Hassam; Lake avenue, 10,773 sq. yds. of brick; Angelique street, 3,529 sq. yds. of brick and 1,224 sq. yds. of stone blocks; Jule street, 1,500 sq. yds. of asphalt.

CONTRACTS TO BE LET.

Washburn, N. D.—Bids are asked until November 10 for grading. O. B. Wing, co. audt.

Tipton, Ind.—Bids are asked until November 2 for constructing gravel roads. J. F. Barlow, co. audt.

St. Paul, Minn.—Bids are asked until November 2 for improving Benson road. Edw. G. Krahmer, co. audt.

Minot, N. D.—Bids are asked until November 5 for constructing certain grades. J. W. Fabrick, co. audt.

Cincinnati, O.—Bids are asked until November 6 for repairing a number of roads.

Valparaiso, Ind.—Bids are asked until November 12 for improving sundry streets. Chas. D. Jones, cy. clk.

Crown Point, Ind.—Bids are asked until November 2 for constructing two gravel roads. C. A. Johnson, co. audt.

Lafayette, Ind.—Bids are asked until November 6 for constructing gravel roads. John P. Foresman, co. audt.

Guayaquil, Ecuador—Bids are asked until December 1 for paving and sewer work. Sewerage and water bd.

Clyde, O.—Bids are asked until November 2 for repairing 2,635 feet of Lay Pike in this town. Co. audt., Fremont.

Toledo, O.—Bids are asked until November 4 for constructing 2,094 miles of gravel road. Bd. chosen freeholders.

Columbus, Ind.—Bids are asked until November 2 for constructing 6,325 feet of road in Ohio twp. John M. Davies, co. audt.

Monticello, Ind.—Bids are asked until November 4 for constructing a gravel road in Union twp. J. L. Ackerman, co. audt.

Two Rivers, Wis.—Bids are asked until November 4 for grading, graveling and curbing Monroe avenue. Wm. Luebke, chmn. B. P. W.

Wabash, Ind.—Bids are asked until November 20 for grading, draining and graveling a public highway. John T. Scott, co. audt.

Greenfield, Ind.—Sealed bids are asked until November 2 for improving a gravel road in Buck Creek twp. Chas. H. Troy, co. audt.

Huntington, Ind.—Bids are asked until November 2 for constructing a gravel road in twp 26, North. John W. Weaver, co. audt.

Lebanon, Ind.—Bids are asked until November 2 for constructing a gravel road in Jefferson twp. B. F. Herdich, co. audt.

Anderson, Ind.—Bids are asked until November 10 for constructing a large number of gravel roads. Wm. T. Richards, co. audt.

Bloomfield, Ind.—Sealed bids are asked until November 4 for constructing a gravel road in Sotckton twp. Peter M. Cook, co. uadt.

Frankfort, Ind.—Bids are asked until November 5 for constructing gravel roads in several townships. Chas. F. Cromwell, co. audt.

St. Louis, Mo.—Bids are asked until November 6 for paving a number of alleys with vitrified brick block. A. J. Reilly, prest. B. P. I.

Hartford City, Ind.—Sealed bids are asked until November 2 for constructing a macadam road in Washington twp. L. W. Daugherty, co. audt.

Mt. Holly, Md.—Bids are asked until November 9 for macadamizing Bridge street in the village of Crosswicks. Joel Horner, dir. bd. freeholders.

Indianapolis, Ind.—Bids are asked until November 6 for constructing a gravel road between Marion and Hancock counties. Albert Sahm, co. audt.

Jasper, Ind.—Bids are asked until November 2 for grading, draining and paving road No. 2, in Patoka twp., with stone. M. A. Sweeney, co. audt.

Muncie, Ind.—Bids are asked until November 4 for paving road with brick and a number with crushed stone and gravel. Jos. E. Davies, co. audt.

Crawfordsville, Ind.—Sealed bids are asked until November 4 for paving College street with vitrified brick. Henry Hulett, cy. clk.

Ithaca, N. Y.—Bids are asked until November 15 for constructing 5,800 lin. ft. of cement sidewalk and 1,690 ft. of curb and gutter. Bryant Park Co.

Crawfordsville, Ind.—Sealed bids are asked until November 7 for paving a road in Brown twp. with crushed stone. Luther R. Long, chum. co. comrs.

St. Louis, Mo.—Sealed bids are asked until November 6 for constructing granitoid walks in a large number of streets. Andrew J. O'Reilly, prest. B. P. I.

Corydon, Ind.—Sealed bids are asked until November 4 for constructing gravel or macadam roads in Jackson and Spencer twp. Thomas J. Stevens, chmn. co. comrs.

Albany, N. Y.—Sealed bids are asked until November 9, 11, and 13 for constructing sixty-three new public highways under the Good Roads law. Frederick Skene, state engr.

Ashland, O.—Bids are asked until November 9 for constructing sidewalks and grading Carroll street, and grading, curbing and paving Church street. E. L. Black, engr.

Kirksville, Mo.—Bids are asked until November 2 for constructing 6,450 sq. yds. of vitrified brick paving, and 5,100 lin. ft. of combined curb and gutter. H. Selby, mayor.

Greenville, Tex.—Bids are asked until November 3 for grading of an earth embankment reservoir, containing about 90,000 cu. yds. Joseph F. Nichols, mayor.

Columbus, O.—Bids are asked until November 4 for paving Columbus, Fifth and Pearl streets, Gustavus Lane and Hunter avenue with brick, and constructing sewers in two alleys. E. W. Hirsch, secy. B. P. S.

Kansas City, Kans.—Bids are asked until November 2 for macadamizing De Fries road to Mill Creek, and until November 7 for constructing one mile of rock road, and until November 9 for macadamizing Eighteenth street. F. M. Holcomb, co. clk.

Greencastle, Ind.—Bids are asked until November 2 for constructing 8,889 ft. of macadamized road in Cloverdale twp. 5,594 ft. in Monroe twp.; 1,700 ft. in Greencastle twp.; 11,913 ft. in Franklin twp. D. V. Moffit, co. audt.

New Brighton, S. I., N. Y.—Bids are asked until November 10 for paving and repairing a number of streets, requiring the following: 4,110 sq. yds. of iron slag block on concrete; 7,860 sq. yds. of wood block paving. Geo. Cromwell, boro. prest.

Indianapolis, Ind.—Bids are asked until November 20 for paving Gladstone avenue with brick; Thirteenth street with bitulithic; Parker avenue and Union street with asphalt; cement sidewalks in York, Rural, Thirty-first and La Salle streets and Park avenue. Joseph T. Elliott, chmn. B. P. W.

Brooklyn, N. Y.—Bids are asked until November 5 for furnishing Hudson river road gravel on Ocean boulevard. Bids are asked until November 4 for 2,500 sq. yds. of asphalt paving in Sixty-first street, and 35,110 sq. ft. of cement sidewalks in several streets. Bird S. Coler, prest boro.

New York City—Sealed bids are asked until November 2 for paving and repaving a number of streets in Manhattan borough with asphalt block, asphalt, wood block, and granite block. John F. Ahearn, prest. boro. Bids are asked until November 2 for furnishing sidewalk curbing, paving, etc., in front of Pavilion A, borough of Manhattan. John W. Brannan, prest. bd. trus. Bellevue and Allied Hospitals.

CONTRACTS AWARDED.

Richmond, Cal.—The contract for macadamizing Fourth street was awarded to Contractor Cushing, for $20,879.

Maysville, Ky.—The contract for constructing sidewalks was awarded to Forman & Frazier, of Lexington, Ky.

Kansas City, Mo.—J. E. Welch was awarded a contract, October 21, for repaving Bluff street at 97 cents a sq. yd.

Beardstown, Ill.—The contract for paving Fourth street with brick has been awarded to J. E. Bretz, of Springfield, Ill.

Palisade Park, N. J.—The contract for improving Anderson avenue was awarded to Jas. J. Fusco & Co., of Newark, for $16,347.

Nashville, Tenn.—The contract for macadamizing Phillips street was awarded, October 15, to T. V. Barnesfield, for $1,413.55.

Beverly, Mass.—The contract for repaving Cabot street with Hassam was awarded to Simpson Bros. Corporation, of Boston.

Los Angeles, Cal.—The contract for paving Temple street and Mountain View avenue was awarded to the Barber Asphalt Paving Co.

Troy, N. Y.—Charles Murray was awarded the contract for regulating and grading Avenue B, and constructing a culvert for $32,711.

East St. Louis, Ill.—Keeley & Gaynord secured the contract for improving Virginia Place, for $11,869, and Thirty-third street for $10,743.

Portsmouth, O.—The contract for paving Robinson avenue with vitrified brick was awarded, October 13, to John A. Grimes, for $25,821.

Great Falls, Mont.—Special.—The contract for paving Fourth street with treated wood blocks was awarded to the Kettle River Quarries Co.

Rochester, N. Y.—The F. C. Lauer & Sons Co. secured the contract, October 14, for paving Rugby street with trap rock macadam for $16,973.

San Mateo, Cal.—The Barber Asphalt Paving Co. was awarded the contract for asphalt paving in San Mateo Heights for about $30,000.

Geneseo, Ill.—The contract for 14,547 sq. yds. of brick paving in State street was awarded to Keyes & McNamara, of La Salle, for $29,527.

Tiffin, O.—The contract for constructing 4,175 sq. yds. of brick paving in N. Sandusky street was awarded to John E. King for $7,497.

St. Joseph, Mo.—The contract for brick paving in Edmond, Twenty-sixth and Twenty-first streets was awarded to H. N. Rice at $1.40, $1.48 and $1.85, respectively.

Martinsburg, W. Va.—The contract for paving the public square with brick was awarded to the H. C. Brooks Co., of Fairmont, W. Va., for $6,000.

Urbana, Ill.—The contract for constructing brick paving in W. California street was awarded to J. W. Stipes, of Champaign, Ill., for $22,000.

Waukegan, Ill.—The contract for paving Marion street with brick was awarded to the McCuge Construction Co., of Fond du Lac, Wis., for $53,966.

Milwaukee, Wis.—The contract for paving Teutonia avenue with asphalt was awarded, October 6, to the White Construction Co. at $2.33 a sq. yd.

New York City—The contract for constructing asphalt tile walks in Central and other parks was awarded to the Hastings Pavement Co. for $51,355.

Oakdale, Ia.—The contract for constructing 12,000 sq. ft. of cement paving at the Iowa Tuberculosis Hospital was awarded to the Cedar Falls Cement Co.

Des Moines, Ia.—A contract for paving Cherry, Fifth and Sixth streets with creosoted wood blocks was awarded to James Horrabin, October 19, at $2.64 a sq. yd.

Austin, Tex.—The contract for constructing 4,965 sq. yds. of vitrified paving in N. Sixth street was awarded to Wm. J. Heffren, of Galveston, at $2.20 a sq. yd.

Columbia, Tenn.—The contract for constructing 20,000 sq. yds. of concrete pavement was awarded to the Tennessee Artificial Stone Co., of Nashville, for $1,800.

Pittston, Pa.—The contract for paving S. Main, Spring, Kennedy, Charles, William and Church streets with Mack block was awarded to McConville & Fitzpatrick for $19,637.

Steubenville, O.—The contract for constructing 2.11 mis. of grading and .78 mi. of macadam road was awarded, October 6, to A. W. McDonald and John L. Martin for $8,759.

Mansfield, O.—The contract for constructing 3.26 mis. of macadamized road in Springfield twp. was awarded, October 13, to Carrel & Gruber, of Caledonia, for $17,778.

Gadsden, Ala.—Charles O. Dincan was awarded a contract, October 15, for constructing cement sidewalks in Chestnut street at 87¾ cents a sq. yd., and driveways at 90 cents a sq. yd.

Anniston, Ala.—The Southern Bitulithic Co., of Birmingham, was awarded the contract for paving Noble, Eleventh, Twelfth and Thirteenth streets with bitulithic at $1.90 a sq. yd., with five year guarantee.

Harrisburg, Pa.—The contract for paving Thompson street with asphalt was awarded, October 12, to the Warner Quinlan Paving Co. at $1.94 and 94 cents a lin. ft. for granite curbing.

Wheeling, W. Va.—Paving contracts have been awarded as follows: Pleasant avenue, E. A. Freshwater & Sons, of Chester, W. Va.; Charles, Commerce and Twenty-second streets, Liggett, Corwan & Garrison.

Tacoma, Wash.—N. A. Jones was awarded the contract for paving in local impvt. district No. 334 for $25,125. Worter Bros. secured the contract for sandstone paving in dist. No. 406.

Monrovia, Cal.—The contract for improving Grand avenue was awarded to the B. R. Davisson Contracting Co. at $1.25 a lin. ft. for grading and oiling, and 30 cents a lin. ft. for cement curb.

Pittsburg, Pa.—The contract for furnishing 300 tons of Kentucky asphalt for road improvements was awarded, October 8, to the Wadsworth Stone & Paving Co., of this city, at $7.50 per ton.

Bloomington, Ill.—I. D. Lain was awarded a contract, October 8, for paving E. Washington street with Moulding

block at $1.85 a sq. yd.; combined curb and gutter, 43 cents; 12 in. vitrified pipe inlets, 45 cents; c. i. curb inlets, $9.25.

New Albany, Ind.—W. O. Sweeney, of Jeffersonville, was awarded the contract for paving Main street with Carlisle block, as follows: From Main street to first alley, $4.54 a lin. ft.; from first alley to Beeler street, $4.74 a lin. ft. on either side.

Reading, Pa.—The contract for paving street intersections with vitrified brick was awarded, October 20, to Fehr & O'Rourke for $1,295. The Toledo Construction Co. has the contract for repairing the asphalt paved streets for $15,066.05.

Houston, Tex.—The Texas Grading Co. was awarded the contract for paving 5½ miles of Cedar Bayou and Crosby road for $31,059. The contract for constructing ¾ mi. of the Lynchburg and Crosby road was awarded to Haden & Smith for $3,259.57, who also received the contract for the Reidlen co. road for $4,592.

San Diego, Cal.—Contracts have been awarded as follows: Improving 41,475 sq. ft. of D street, including culverts, Fairchild, Gilmore & Wilton Paving Co., of Los Angeles, $8,435; 151,679 sq. ft. of H street, including culverts, Barber Asphalt Paving Co., of Los Angeles, $26,807.

Tacoma, Wash.—Grading and paving contracts were awarded, October 13, as follows: Grading Columbia avenue, Joe Wells, $11,322; grading and constructing cement sidewalks in N. Ferdinand street, W. H. Hickey, $18,919; paving N. Twenty-first street, W. H. Hickey, $17,450; paving Commerce street, F. A. Keasal, $62,213.

Bloomington, Ind.—Contracts for constructing pike roads have been awarded as follows: About 1 mi. in Washington twp., Jack Robinson, $1,695; ¾ mi. in Washington twp., M. E. Smiley, $1,755; repiking about 2 mis. of Unionville road in Bloomington twp., Mill & McCormick, of Smithville, $4,323; Walker street road in Perry twp, Compbell & Dobson, $1,000.

Salt Lake City, Utah—Special.—Louis C. Kelsey, cy. engr., advises us that the contract for constructing sidewalk extension No. 10 was awarded, September 25, to James Kennedy Construction Co. for $203,017.15. The other bids submitted were as follows: S. Birch & Sons, $214,423.78; J. W. Mellen, $205,332.40; Davis & Hueser, $249,535.39. The contract for constructing paving extension No. 47 was awarded, October 9, to P. J. Moran for $3,660.02.

Atlanta, Ga.—The contract for constructing macadam roadways in Ponce de Leon avenue, Druid Hills, was awarded, October 3, to D. Nichols & Son, as follows. 26,000 sq. yds. macadam, 45½ cents; 200 lin. ft. old gutter to be readjusted, 21 cents, and 2,600 lin. ft. new gutter, 40 cents; total, $13,146. T. Meehan & Son, of Philadelphia, Pa., bid for this work $34,730.

Hartford, Conn.—Contracts for constructing state roads were awarded, October 5, as follows: Town of Columbia, 8,300 lin. ft. grading and telford, on the main road to Willimantic, to Ahern Bros., Putnam, Conn., at 68 cents per lin. ft. for grading and 87 cents per lin. ft. for telford; 1,740 lin. ft. gravel on the Toll-and road to Antonio Vito, Thompson, Conn., at $3,445; 575 lin. ft. gravel-telford on the Columbia Green road to same.

Hartford, Conn.--Contracts were awarded, September 29, for constructing roads as follows: 10,000 lin. ft. of gravel and gravel telford road in North Stonington to Edward M. McNight, of Westerly, at 97 cents per lin. ft. for gravel and $1.55 for gravel telford; 4,874 lin. ft. grading and telford in Watertown to Pearson Engineering & Constr. Co., of Bristol, $8,000; 8,100 lin. ft. grading and gravel telford road in Franklin to W. B. Wilcox, of Norwich, gravel 83 cents per lin. ft. and $1.33 for gravel and telford, and 8,000 lin. ft. of macadam and telford road in Norwich, A. Brazos & Sons, of Middletown, $1.86 per lin. ft. for macadam and $2.86 for macadam and telford.

SEWERS.

CONTEMPLATED WORK.

Columbus, Neb.—A storm water sewer system is contemplated.

Columbus, O.—The construction of a relief sewer in Scott st. is proposed.

Sioux Rapids, Ia.—The construction of a sewerage system is contemplated.

Newkirk, Okla.—The question of constructing a sewerage system is being discussed.

Whittier, Cal.—The question of constructing sewers is under consideration.

Las Vegas, Mich.—The construction of a sewerage system is contemplated.

Havelock, Neb.—The question of constructing a sewerage system is being considered.

Hubbard, Tex.—The construction of a sanitary sewerage system is contemplated.

Marysville, O.—The construction of a sanitary sewerage system is under consideration.

Grundy Center, Ia.—Plans and specifications have been completed for a sewerage system.

Silvis, Ill.—Plans have been prepared for constructing the proposed sewerage system.

Forest Grove, Ore.—The construction of a new sewerage and water works system is contemplated.

Jenkintown, Pa.—The question of constructing a sewage disposal plant is under consideration.

Moundsville, W. Va.—The question of constructing the proposed sewerage system has been postponed.

Madison, Ill.—The joint construction of a sewerage system by this city and Venice is proposed.

Akron, O.—An ordinance has been passed for constructing sewers in West Thornton and Mayfield sts.

Wilkinsburg, Pa.—The question of constructing a sewer near Nine Mile Run is under consideration.

Dayton, O.—Plans are being prepared for constructing a storm water intercepting sewer in North Dayton.

Bowling Green, Ky.—The question of issuing $15,000 bonds for constructing a sewerage system will be voted on in November.

East San Jose (San Jose P. O.), Cal.—H. B. Fisher, town engr., has been authorized to prepare plans for a sewerage system.

Atlanta, Ga.—An ordinance has been adopted providing for the construction of a sewer in Peachtree st. W. J. Campbell, cy. clk.

Aurora, Ill.—The city engineer will prepare plans at once for the construction of sewers east of Jackson st. and south of 2nd ave.

Portland, Ore.—Plans are being prepared for constructing a sewerage system in Sellwood, west of 15th st., to the Willamette river.

Clifton Heights, Pa.—A committee has been appointed to confer with other boroughs regarding the erection of a sewage disposal plant.

Trenton, Mich.—Plans for a sewerage system have been submitted by Mason L. Brown, of Detroit, who estimates the cost at $45,000.

Monroe, Wis.—The city council has authorized the construction of 5,700 ft. of sewer and the question of issuing bonds will be voted on.

Monticello, Ark.—Surveys and plans for a system of house sewers 7 mis. long will be made by Walter G. Kirkpatrick, of Jackson, Miss.

Marshall, Ill.—The construction of a sewer on the east side, at a cost of $20,000, is contemplated. J. W. Lewis, chmn. bd. local impvts.

South Bend, Ind.—Plans and specifications have been filed for constructing about 2,500 ft. of 24 to 12-in. pipe sewers. A. J. Hammond, cy. engr.

Baltimore, Md.—The construction of sewers in the Forest Park and W. Arlington sections of this city is under consideration. B. T. Fendall, cy. engr.

Marshfield, Ore.—Plans and specifications are being prepared for a sewerage system covering the entire city, the sections to be completed as required.

New York City.—Prest. Cromwell, of the borough of Richmond, urges the issue of corporate stock for the construction and operation, for one year, of a sewage disposal experimental station.

San Francisco, Cal.—An ordinance has been passed providing for the construction of an intercepting sewer in E. Potrero st. and sewers in Fulton, Devisadero and Grove sts. and Masonic ave.

Bellingham, Wash.—An ordinance has been passed providing for the construction of a concrete tunnel, 1,500 ft. in length, in Champion st., to carry the sewage from the drainage district of Prospect st.

St. Joseph, Mo.—The city council authorized, Oct. 19, the expenditure of $250,000 for constructing main sewers. The bd. of pub. wks. was directed to engage a consulting engineer to prepare plans and specifications for the sewers.

Elgin, Ill.—Plans are being prepared for constructing a system of combined sewers for the 5th ward.

Muskogee, Okla.—This city voted to issue $550,000 for constructing a storm sewer and water works extensions.

Elkhart, Ind.—The construction of sewers in Madison st. and Johnson's Riverside addition is contemplated.

Marysville, O.—Plans and specifications for a sanitary sewerage system will be prepared by J. C. Kennedy.

Arlington, Tex.—The property owners have petitioned for the construction of a sewerage system. Mayor Weeks.

Carterville, Mo.—Plans are being prepared for 14 blocks of vitrified pipe sewers. N. A. Spence, cy. clk.

Centralia, Wash.—Plans and specifications have been adopted for constructing a sewer system in Dist. No. 10.

Quincy, Ill.—City Engineer Hancock estimates the cost of constructing the North End sanitary sewer at $53,997.

West Chester, Pa.—The question of installing a sewerage system and sewage disposal plant is being discussed.

Lansing, Mich.—Plans are being prepared for constructing 3,000 ft. of sewer in Ionia, Lahoma, Michigan and Huron sts.

Oconomowoc, Wis.—Plans have been prepared for constructing a sewerage system in Main, Milwaukee, South and Worthington sts.

Linden Heights, O.—Plans for a storm sewer system will be prepared by Bradbury & Shute, cons. engrs., Hayden bldg., Columbus.

Corona, Cal.—Plans for an outfall sewer from Howard and Joy sts. to Cota st. have been prepared by cy. engr. Harrell.

Indianapolis, Ind.—Bids will be asked at once for constructing a sewer system in Brightwood, at a cost of about $190,000.

Syracuse, N. Y.—Plans are being prepared for constructing an intercepting sewer. Harry Hamlin, secy. intercepting sewer bd.

Corpus Christi, Tex.—The question of establishing a sewerage system and a sewage disposal plant is being investigated.

Altus, Okla.—Special.—E. E. Hudson, Box 183, advises us that he is in the market for sewer pipe, water pipe and water towers.

Hammond, Ind.—Municipal officers from various cities met in this city Oct. 15 to take preliminary action towards the solution of the sewage problem of the Calumet region, extending from Michigan City to the Illinois State line. Mayor Becker.

Hartford, Conn.—Fred L. Ford, cy. engr., has completed his report on the abatement of nuisances caused by freshets in the Connecticut river. He estimates the cost of constructing an intercepting sewer, with the necessary pumping stations, at $300,000 to $350,000.

CONTRACTS TO BE LET.

Ashland, Wis.—Bids are asked until Nov. 3 for constructing sewers. Jas. Phillips, cy. engr.

Cookeville, Tenn.—Bids are asked until Nov. 2 for constructing a sewerage system. County court.

Ithaca, N. Y.—Bids are asked until Nov. 15 for constructing 3,000 lin. ft. of 6-in. sewer. Bryant Park Co.

Toledo, O.—Bids are asked until Nov. 2 for constructing various sewers. Reynold Voit, secy. B. P. S.

Davenport, Ia.—Sealed bids are asked until Nov. 3 for constructing a sewer in 7th st. Thomas Murray, cy. engr.

Elizabeth, N. J.—Bids are asked until Nov. 2 for constructing an intercepting sewer. N. K. Thompson, ct. comr.

Appleton, Wis.—Bids are asked until Nov. 4 for constructing a sewer in Harris st. E. I. Williams, cy. clk.

New Ulm, Minn.—Bids are asked until Nov. 3 for constructing a sewer in Center st. Ernst Wichersky, cy. clk.

Burlington, Ia.—Bids are asked until 4 p. m., Nov. 2, for constructing a vitrified pipe sewer. J. F. Winston, cy. engr.

Spencer, Ia.—Bids are asked until Nov. 6 for constructing a vitrified pipe sewer in Main st. R. L. Taylor, cy. clk.

Haverstraw, N. Y.—Bids are asked until Nov. 4 for constructing a sewerage system. Thos. Lynch, prest. vil. trus.

Northwood, Ia.—Bids are asked until Nov. 11 for constructing tile drains and a drainage ditch. Iver Iverson, Jr., co. audt.

Eldora, Ia.—Bids are asked until Nov. 9 for constructing a ditch and drain in drainage ditch No. 3. R. A. Vigars, co. audt.

Clarksdale, Miss.—Bids are asked until Nov. 10 for constructing 1¾ mis. of 8-in. house sewers. M. W. Purnell, cy. clk.

Hartwell, O.—Sealed bids are asked until Nov. 16 for constructing sewers and a sewage disposal plant. Frank J. Spinning, vil. clk.

Guayaquil, Ecuador, S. A.—Bids are asked until Dec. 1 for constructing sewerage and paving works in this city. Sewerage and water sup. bd.

Washington, D. C.—Bids are asked until Nov. 2 for constructing the Congress Heights trunk sewer. H. B. F. McFarland, chmn. Dist. Comrs.

Springfield, O.—Bids are asked until Nov. 5 for constructing sewers in Fountain, Euclid and Lagonda aves. and other streets. Wm. H. Mahoney, clk. B. P. S.

Wyoming, O.—Sealed bids are asked until Nov. 4 for constructing 22,569 ft. of sanitary sewers and appurtenances and a sewage disposal plant. W. A. Clark, vil. clk.

Marshall, Ill.—Bids are asked until Nov. 12 for constructing about 2 mls. of reinforced and vitrified pipe sewers. Bd. local impvts.; Paige & Stock, engrs., Terre Haute, Ind.

Mt. Vernon, Wash.—Bids are asked until Nov. 4 for constructing a sewer system in Milwaukee, Snoqualmis, Kincaid, Myrtle, Gates, Montgomery and other streets. J. S. Bowen, cy. clk.

Indianapolis, Ind.—Bids are asked until November 6 for constructing 1,675 feet of sewer beneath the market house and in Wabash street. Jos. T. Elliott, chmn. B. P. W.

Burlington, Ia.—Bids are asked until Nov. 14 for constructing part of a drainage system, requiring 200,000 cu. yds. of excavation and 8,200 lin. ft. of 18-in. tile drain, in sec. 2, and 17,460 cu. yds. of excavation and 2,400 lin. ft. of 15-in. tile drain, in sec. 3. Dan P. Hill, co. audt. Des Moines co.

New Brighton, S. I., N. Y.—Bids are asked until Nov. 10 for constructing a separate storm water outfall sewer, requiring the following: 617 lin. ft. of reinforced concrete sewer of flat roof twin section and 3 ft. circular sanitary sewer; 50 lin. ft. 15-in. salt-glazed vitri. pipe sewer; 400 lin. ft. 8-in.; 4 reinforced concrete receiving basins, with 1¼-in. galvanized wrought iron bars; 7 brick manholes; 2 manholes on flat roof sewer, complete; 9,300 lin. ft. of piles, furnished, driven and cut; 15,000 ft. yellow pine found. timber and planking; 38,000 ft. spruce planking, in place and secured; 10,000 ft. sheeting, retained; 300 sq. ft. of additional reinforcing metal, equal and similar to Nos. 4 and 10 expanded metal, furnished and placed; 300 lbs. of additional reinforcing metal, equal and similar to corrugated steel rods, furnished and placed; structure for support of the railroad tracks, complete, as shown on the plan of the work, etc. Geo. Cromwell, boro prest. at St. George, New Brighton.

CONTRACTS AWARDED.

Quincy, Ill.—Peter Simons was awarded the contract for constructing a sewer in 7th st., for $1,195.

Pipestone, Minn.—The contract for constructing sewer work was awarded to W. C. Fraser, of Rochester, Minn., for $2,084.

Chicago, Ill.—John W. Farley submitted the lowest bid, Oct. 14, for constructing the Western ave. sewer, at $427,608.

Monroe, Ga.—The contract for constructing a sewerage system was awarded to J. B. McCrary & Co., of Atlanta, for $19,686.22.

Oblong, Ill.—The contract for constructing a sewerage system was awarded to I. W. Osborne & Co., of Mattoon, Ill., for $5,537.

Appleton, Wis.—The contract for constructing 1,000 ft. of 36-in. pipe sewer was awarded, Oct. 6, to Oliver G. Kringle, of Elkader, Ia.

Jackson, Miss.—The contract for constructing sewerage extensions was awarded, Oct. 7, to M. O'Herrin & Co., of Pittsburg, Pa., for $36,500.

Cienfuegos, Cuba.—The contract for constructing a sewerage and water works system for this city was awarded to Hugh J. Reilly, for $3,080,000.

Rochester, N. Y.—The F. C. Lauer & Sons Co. was awarded the contract for constructing the outlet sewer in N. Water st., for $20,075.33.

Birmingham, Ala.—The contract for constructing vitrified brick sanitary sewers was awarded to C. M. Burkhalter, of this city, for $23,035.

David City, Neb.—The contract for constructing sewers in sewer districts Nos. 1, 2 and 3 was awarded to Lanna & Co., of Harlan, Ia., for $11,959.

Fort Smith, Ark.—The contract for constructing 1,150 ft. of 26x39-in. and 1,350 ft. of 24x36-in. brick sewer, and 500 ft. of D. S .pipe sewer, was awarded to Fitzpatrick, Fisher & Noyes, for $8,300.

Louisville, Ky.—The Henry Bickel Co., of this city, was awarded the contract for constructing contract No. 13 of the comprehensive sewerage system, consisting mainly of concrete, for $12,010.

Lawrence, Kans.—The contract for constructing lateral sewers was awarded, Oct. 5, to Graeber Bros., of this city. P. A. Johnson & Co., of Kansas City, Kans., was awarded the contract for constructing 6,000 ft. of main sanitary sewer.

Salt Lake City, Utah.—Special.—Louis C. Kelsey, cy. engr., advises us that sewer contracts have been awarded as follows: Sewer extension No. 203, V. P. Strange, city, $12,774.43; sewer extension No. 199, James Kennedy Construction Co., $31,-210.90.

Galion, O.—Special.—Bids were submitted Oct. 19 for constructing an intercepting sewer, as follows: H. J. Stough, Galion, $27,886.88; P. Drake & Sons, Marion, O., $22,384; J. Murphy & Co., Marion, O., $24,453.74; U. S. Construction Co., Columbus, O., $23,388.81; H. J. Glover, Lorain, O., $22,025.57; H. W. Mathews, Lorain, O., $23,440.13; L. P. Batterfeld, Bucyrus, O., $26,933.38; Stratton & Applegate, Alliance, O., $31,110.62; Price & Hurley, Marion, O., $22,536.75.

WATER WORKS.

Pittsburg, Pa.—This city's new filtration is in operation, thirty-eight filter beds being in use and a number of others are being cleaned and gotten ready for operation, as they are needed. The plant cost $7,000,000.

Camden, N. J.—The Stone Harbor Water Co. has been incorporated to operate water works, by Howard S. Risley, of Buffalo; Chas. A. Farnum and G. Horace Roberts, of Philadelphia; Lewis Starr, Woodbury, N. J.; Edward C. Waddington, Woodstown, N. J.; Wm. S. Casselam, Jr., Camden; John G Herner, Mt. Holly, N. J.

CONTEMPLATED WORK.

Orange, Va.—A water works system is contemplated.

Emporia, Kans.—A new water works system is contemplated here.

Spooner, Minn.—Voted to issue bonds for constructing a water works system.

Eveleth, Minn.—Plans and specifications for a reservoir have been completed.

Myersville, Md.—Council has decided to establish a water works system.

Baldwin, Kans.—The construction of a water works system is contemplated.

Minot, N. D.—Bonds shave been sold for the construction of a water works system.

Wilton, Wis.—Voted to issue bonds for constructing a water works system.

Salem, O.—Plans for a water works system will be prepared by L. E. Chapin, of Canton.

Neoga, Ill.—The question of constructing a water works plant is being agitated.

Huron, O.—The question of constructing a water works system may be voted on.

Webster, N. Y.—Voted to issue $32,000 bonds for establishing a water works system.

Presbo, S. D.—This town voted to issue bonds for constructing a water works system.

Plainview, Tex.—Voted to issue $28,000 bonds for constructing a water works system.

Indianola, Ia.—Bonds will probably be issued for constructing a water works system.

Ennis, Tex.—This town voted to issue $13,000 for establishing a water works system.

Winterset, Ia.—This city voted to issue $60,000 for constructing a new water works system.

Mansfield, O.—The question of increasing and improving the water supply is under consideration.

Marion, Ala.—Special.—T. D. Kemp, supt. w. w. advises us that he is in the market for motors.

Forest Grove, Ore.—The construction of a new water works and sewerage system is contemplated.

Roanoke, Ill.—Petitions are being circulated asking for the construction of a water works system.

Augusta, Ga.—Bids will probably be asked soon for constructing an auxiliary pumping station.

Hibbing, Minn.—The question of installing an air lift system for pumping water is under consideration.

Bisbee, Ariz.—This city advocates the construction of a new and complete municipal water works system.

Mooresville, N. C.—Voted to issue bonds for constructing a water works system and improving the streets.

Ogden, Utah—Plans are being prepared for the construction of a new reservoir for the water works system.

Verdigris, Neb.—The question of constructing water works will probably be voted on. Estimates have been prepared.

Brookfield, Mo.—Special.—James W. Lacey advises us that he desires to purchase a steam boiler and c. i. water pipe.

Silvis, Ill.—An ordinance has been passed providing for the construction of 8-in. water mains in a number of streets.

Marion, N. C.—This city voted to issue $20,000 for a gravity water supply system, requiring six and one-third miles of 16-inch piping.

Winchendon, Mass.—This town voted to authorize the bd. of water comrs. to purchase an additional pump for the pumping station.

Springfield, Mass.—Plans and specifications are being prepared for contract 5 of the Little river water supply system.

Spirit Lake, Ia.—This town voted favorably on the proposition to issue $22,000 bonds for constructing a water works system.

Altus, Okla.—Special.—E. E. Hudson, Box 183, advises us that he is in the market for water pipe, water towers, and sewer pipe.

Sherman, N. Y.—Plans and specifications for a new water supply for this village will be made by E. A. Wilder, of Fredonia, N. Y.

Branchville, N. J.—The mayor and council passed a resolution, subject to a vote of the citizens, providing for a water supply system.

McPherson, Tex.—The question of issing $65,000 bonds for the purchase and extension of the water works and electric light system may be voted on.

Washington, D. C.—The estimated cost of the proposed Washington aqueduct is $39,000, and of the Washington aqueduct and filtration plant $190,640.

Pompeii, Pa.—Special.—J. W. Genteel, Lock Box 165, desires the names of firms selling c. i. and w. i. pipes of 4, 5, 6, 7, and 8 inches in diameter, for reservoir uses.

Kansas City, Mo.—The members of the fire and water board of this city made a tour of inspection of the water works plant of Cincinnati, O., October 22, and of the plant at Louisville, October 23.

Canandaigua, N. Y.—The bd. of trustees voted, October 6, to expend $35,000 for the erection of a water works system to replace the present one, which is inadequate for the needs of this city.

Aberdeen, Wash.—The superintendent of public works has been directed to prepare plans for a new main across the Chehalis river to connect the south side and north side water systems.

New Ulm, Minn.—The construction of a new reservoir and improvements to the water works system is contemplated, and a committee of city officials will visit Mankato, Northfield, Faribault, St. Paul, Minneapolis, and Stillwater, Minn., and Hudson, Wis., for the purpose of investigating systems in those cities.

New York City—The plan recently approved by the board of estimate and apportionment for obtaining an additional water supply from the underground waters of Suffolk county, Long Island, provides for a gravity conduit, constructed of reinforced concrete, extending from the present central pumping station at Ridgewood to a point near East Quogue, a distance of seventy-three miles, and a chain of driven wells 500 to 1,000 feet apart and 100 to 200 feet deep.

CONTRACTS TO BE LET.

Gadsden, Ala.—Bids are asked until November 12 for constructing a new water works system. J. G. Dunlap, mayor.

Daytona, Fla.—Bids are asked until January 1 for constructing a water works system. D. D. & C. M. Rogers, engrs.

Stockton, Ill.—Sealed bids are asked until November 6 for drilling and piping a deep well. Freeman Lawfer, vil. prest.

Fort George Wright, Wash.—Bids are asked until 11 a. m. November 2 for furnishing fourteen fire hydrants. Lieut. Ralph Dickinson, Q. M.

Greenville, Tex.—Bids are asked until November 3 for the graduation of an earth embankment reservoir. Joseph F. Nichols, mayor.

St. Marys, Kans.—Bids are asked until November 10 for constructing a water works system. Burns & McDonnell, engrs., Scaritt Bldg., Kansas City, Mo.

Toledo, O.—Sealed bids are asked until November 12 for constructing the pumping station of the filtration works. Roynold Voit, secy. B. P. S.

Madison, Wis.—Bids are asked until November 3 for enlarging a steel tank at the State Hospital, Mendota. M. J. Tappins, secy. state bd. of control.

Cohoes, N. Y.—Plans and specifications will be received until November 3 for a mechanical filter plant for this city. H. L. Shaver, prest. bd. water comrs.

Toledo, O.—Sealed bids are asked until November 4 for the driving of piling at the intake crib at the water works pumping station. Reynold Voit, secy. B. P. S.

Kansas City, Mo.—Sealed bids are asked until November 9 for constructing a settling basin adjoining the present settling basins at Quindaro. Bd. fire & water comrs.

Fort Slocum, N. Y.—Bids are asked until November 7 for extending a water main, requiring 600 feet of 4-inch main, two fire hydrants, and ¼-inch gate valve and valve box. Capt. Peter Murray, const. Q. M.

Wilmington, Del.—Bids are asked until November 23 for constructing a covered slow sand filtration plant, together with filtered water reservoir, filter sand washing apparatus and other appurtenances. John A. Kienle, ch. engr.

Chicago, Ill.—Sealed bids are asked until November 11 for excavating sec. 12 of the north shore channel, building a reinforced concrete dam, and performing certain collateral bridge work. Robt. R. McCormick, prest. bd. trus. sanitary dist.

New York City—Bids are asked until November 17 for making borings along one or more lines, south of Hill View reservoir, lying mainly in the boroughs of Bronx, Manhattan and Brooklyn, including lines crossing Harlem river and East river. Thos. Hassett, secy. bd. water sup.

Clarksville, Miss.—Sealed bids are asked until November 10 for constructing ¾-mi. of 6-in. water mains, including hydrants and valves, and a reservoir about 80 feet long, 55 feet wide and 9 feet deep with metal shingle roof. M. W. Purnell, cy. clk.; Walter G. Kirkpatrick, cons. engr., Jackson, Miss.

CONTRACTS AWARDED.

La Crosse, Wis.—The United States Iron Foundry Co. was awarded the contract for furnishing pipe for $2,450.

Allegan, N. Y.—The contract for constructing a water works system was awarded to Dean & Havens, of Olean, for $26,900.

Jackson, Miss.—The contract for constructing water works extensions was awarded to M. O'Herrin & Co., of Pittsburg, Pa., for $25,819.80.

Shakopee, Minn.—The contract for constructing a water works system was awarded, October 5, to W. C. Frazer, of Rochester, Minn., for $5,150.

Creston, Wash.—The contract for constructing a pumping station for the water works plant was awarded to the Halladie Machinery Co., of Spokane.

Marcellus, N. Y.—Special.—Contracts for constructing a water works system were awarded, September 30, as follows: Labor, Edson Bros:. Phelps, N. Y., $17,591.75; c. i. pipe and specials, Chas. Miller & Son, Utica, N. Y., $10,461; hydrants and valves, Ludlow Valve Co., Troy, N. Y., $973.75.

Lenoir, N. C.—The contract for constructing a reservoir was awarded, October 7, to the Piedmont Construction Co., of Atlanta; valves and hydrants, Fairbanks Co., of Baltimore; pipe, Dimmick Pipe Co., of Birmingham.

Verona, N. J.—The contracts for constructing a new water supply system were awarded as follows: Excavating and laying mains, Puglia & Palmer Co., of Paterson, $15,748.88; pipe, and fittings, United States Cast Iron Pipe and Foundry Co., $25,250.57; hydrant and boxes, Eddy Hydrant Co., $2,248.95; valves and valve boxes, the Fairbanks Co., $2,270.12.

BRIDGES.

Greenville, S. C.—This city will construct a bridge across Reedy river.

Clifty, Ind.—Bids will soon be asked for the construction of a bridge over Haw creek.

Vincennes, Ind.—Bids are asked until November 4 for repairs to Antibus bridge. John T. Scott, co. audt.

Tipton, Ind.—Bids are asked until November 6 for constructing a joint county bridge. J. F. Barlow, co. audt.

Frankfort, Ind.—Bids are asked until November 7 for constructing four bridges. C. F. Cromwell, co. audt.

Fremont, Neb.—Bids are asked until November 10 for constructing six steel bridges. Jas. A. Donohue, co. clk.

Mishawaka, Ind.—The county commissioners contemplate the erection of a bridge across the river at Logan street.

Dolores, Colo.—Bids are asked until November 10 for constructing two timber bridges. W. W. Byers, chmn. bd. co. comrs.

Salem, Ind.—Bids are asked until November 2 for constructing a bridge over Carters creek. Sam G. Ellis, co. audt.

Milwaukee, Wis.—The bd. of pub. wks. will repair the Sixteenth street viaduct at a cost of $50,000. Chas G. Poetsch, cy. engr.

Princeton, Ind.—Bids are asked until November 4 for the construction and repair of certain bridges. Harry Embrose, co. audt.

Lincoln, Neb.—Bids are asked until November 2 for constructing a reinforced concrete culvert on O street. W. L. Dawson, co. clk.

Whitefish Point, Mich.—Bids are asked until November 15 for building a bridge across Tahquemanon river. Frank House, highway comr.

Augusta, Ga.—Nisbet Wingfield, comr. pub. wks., has received specifications for a new steel bridge across the river at Center street.

Magazine, Ark.—The construction of a steel bridge across Petit Jean river, near here, is contemplated by the county commissioners.

Marianna, Ark.—Bids are asked until November 18 for constructing a steel highway bridge over L'Anguilla river here. E. W. King, co. clk.

Toledo, O.—Bids are asked until November 11 for constructing a bridge and abutments over Swan creek, in Adams twp. L. B. Bailey, chmn. co. comrs.

Charles City, Ia.—Bids are asked until November 12 for constructing a steel concrete bridge over Cedar river at Main street. H. B. Rosenkrans, co. audt.

Philo, O.—Bids are asked until November 2 for constructing a concrete abutment at the west end of the river swing bridge here. L. E. Brelsford, co. audt.

Cleveland, O.—Bids are asked until November 11 for constructing a concrete bridge in Strongsville twp., and a retaining wall. Wm. F. Black, co. clk.

Cincinnati, O.—Bids are asked until November 13 for constructing a concrete bridge on Main street, in Madisonville. Stanley Struble, prest. co. comrs.

Austin, Tex.—Bids are asked until November 5 for constructing a reinforced concrete arch bridge over Colorado river on Congress avenue. John W. Horneby, co. judge.

Indianapolis, Ind.—Bids are asked until November 4 for constructing the superstructure of a bridge over Eagle creek on Mars Hill road. Albert Sahm, co. audt.

Kansas City, Mo.—Surveys have been completed and profiles are being made for the construction of a bridge across Blue river at Independence avenue. J. L. Darnell, cy. engr.

Fargo, N. D.—Bids are asked until November 4 for constructing a new bridge in Mapleton and Rush twps., and repairs to a bridge in Durbin twp. Arthur G. Lewis, co. audt.

Cedar Rapids, Ia.—The common council has passed resolutions for the construction of a reinforced concrete bridge on Fourteenth avenue. E. C. Smith, cy. engr.

Rochester, Ind.—Bids are asked until November 2 for constructing a concrete arch bridge in Henry twp., and for repairs to another bridge. Geo. W. DuBois, co. audt.

STREET LIGHTING.

Tokawa, Okla.—Plans are being prepared for an electric light plant.

Newton, Wash.—This city contemplates installing an electric light and water works system.

Beaufort, N. C.—This town will issue $20,000 bonds for an electric light plant and drainage system.

New Haven, Conn.—Plans are being prepared for a central electric light plant for Yale University.

East Point, Ga.—The construction of an electric light plant is contemplated. J. McKenzie, mayor.

Buffalo, Minn.—This town will vote on the issue of bonds for constructing a municipal electric light plant.

Union, Mo.—The citizens of this city voted, October 5, to grant an electric light franchise to W. W. McCurdy.

St. Marys, Kans.—Bids are asked until November 10 for constructing an electric light plant. Dr. N. S. Clother, mayor.

Pensacola, Fla.—Surveys have been made on the property adjacent to Turner's Mill Pond for installing a hydro-electric plant.

Milwaukee, Wis.—According to local press reports bids are to be asked at once for a municipal lighting plant. Chas. J. Poetsch, cy. engr.

Napu, Cal.—Bids are asked until November 11 for a franchise to conduct a farmers' power line from this city through the Napa Valley. Co. supvrs.

Quitman, Ga.—The installation of a 50-light a. c. series system and two 200-h. p. boilers at the municipal electric light plant is contemplated. J. D. Wilson, mayor.

Dunkirk, N. Y.—The contract for installing a new turbo-generator set in the municipal electric light plant was awarded to the Allis-Chalmers Co., of Milwaukee, Wis., for $14,997.

Buffalo, N. Y.—Specifications will be prepared for furnishing and installing an engine and generator at the Hamburg Canal pumping station for the purpose of furnishing light and power.

Plattsburg Barracks, N. Y.—Bids are asked until November 18 for constructing a transformer station, and for furnishing electric current, and for constructing an electric lighting system here. Constr. Q. M.

Atlantic City, Ia.—The Atlantic Gas & Fuel Co. has awarded a contract for erecting a 30,000 gal. steel tank gas holder to the Stacey Mfg. Co., of Cincinnati, O., and for a 4 ft. water gas set to the Western Gas Construction Co.

Canadaigua, N. Y.—The bd. of water commissioners has requested an appropriation of $35,000 to be used for installing two motor driven centrifugal pumps, and bids will be asked as soon as the appropriation has been granted.

Belleville, Ill.—The business men of this city are interested in the organization of a mutual lighting ocmpany. Plans for the proposed electric light plant have been submitted by C. L. Armstrong and J. P. Quamm, of St. Louis, Mo., according to press reports.

GARBAGE DISPOSAL, STREET CLEANING AND SPRINKLING.

Youngstown, O.—The contract for the collection and removal of garbage for five years has been awarded to Chas. Fischer, of York, Pa., at $2.90 a ton.

Columbus, O.—Bids are asked until November 9 for the machinery and equipment for a garbage disposal plant. Henry Wagner, cons. and san. engr., Cincinnati.

London, England—Bids are asked until November 10 for furnishing and erecting a sixty ton refuse incinerator for Adelaide. Agt. Gen. for So. Austr., 1 Crosby Sq.

Ft. Andrews, Mass.—The contract for constructing a garbage crematory and building was awarded to the Morse-Boulger Destructor Co., of New York City, for $3,950.

PARKS.

Mason City, Ia.—The organization of a park system and the appointment of a park commission is contemplated.

Baltimore, Md.—The park board has purchased two sites aggregating about forty acres as an addition to the park system.

Seattle, Wash.—It is proposed to condemn six acres for park purposes on Queen Anne Hill, overlooking the city, the sound, and Mt. Rainier.

Salt Lake City, Utah—A plan is proposed here for creating a park, to be one of the largest in the country, in the hills back of the city.

Rutherford, N. J.—Council passed an ordinance, October 6, authorizing the purchase of the Rutherford Field Club Grounds for a public park.

Oakland, Cal.—The question of establishing a system of playgrounds and athletic fields is under consideration. Walter B. Fawcett, secy. B. P. W. is interested.

Philadelphia, Pa.—Council has directed that five parkways be placed upon the city plan, with the plaza of the South Broad street boulevard as the central point. This is in pursuance of the general plans of the City Parks Association for a comprehensive park system.

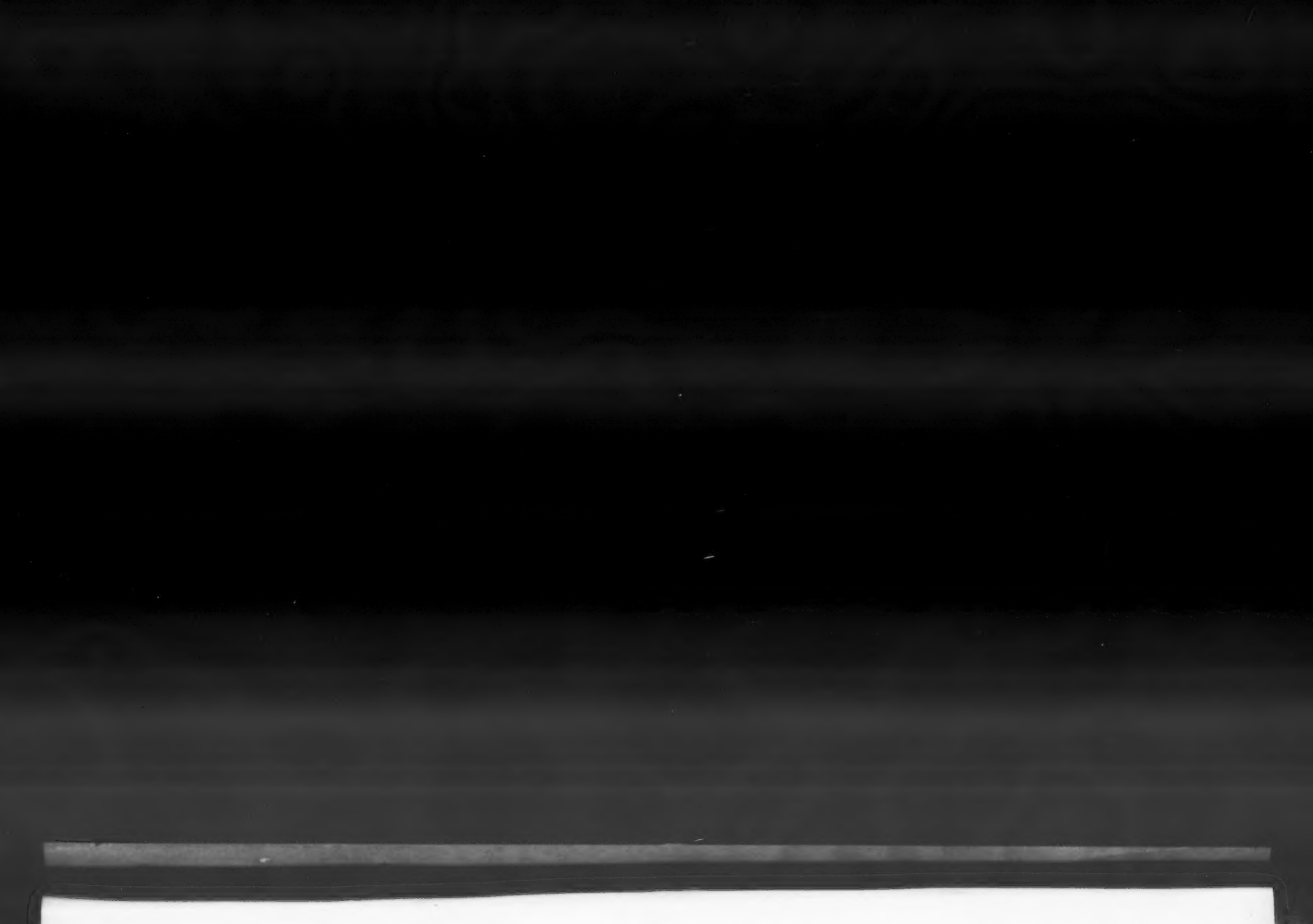
Elkhart, Ind.—J. A. Rice, of New York, has offered this city a forty acre tract of land for a park, and an addition of fifty acres to the city cemetery on condition that the city pay him $600 a year during his life and spend $600 a year after his death in improving the park.

FIRE APPARATUS.

Virginia, Minn.—The installation of fifteen additional fire alarm boxes is recommended.

Sioux Falls, S. D.—The council fire committee will secure prices on an aerial fire truck.

Miles City, Mont.—The question of purchasing chemical fire extinguishers for the fire department is being agitated.

Muskegon, Mich.—Bids are asked until November 2 for a first size service truck for the fire department. B. H. Tellman, cy. recdr.

Portland, Ore.—The contract for installing new fire alarm boxes was awarded to the Gamewell Fire Alarm & Telegraph Co., of New York City.